1919-1920.

(Fifteenth Year of the Meteorological Committee).

NINETY-THIRD MEETING.

South Kensington, S.W. 7, 4th April, 1919.

PRESENT :

SIR NAPIER SHAW, IN THE CHAIR.

MR. BARSTOW.	THE HYDROGRAPHER.
CAPTAIN HARVEY.	COLONEL LYONS.

758. A special meeting was summoned for this day to consider a draft letter which it was proposed to send to the Treasury in reply to a request from Sir Thomas Heath for an opinion of the Meteorological Committee on questions arising in connection with the proposed transfer of the Office to the Department of Scientific and Industrial Research (Minute 749).

Read—a letter from Sir Thomas Middleton expressing his approval of the draft letter which had been circulated. Also a letter from Professor Schuster expressing the opinion that, by including representatives of the departments with the men of science on the Advisory Council, the proposed Meteorological Board might be dispensed with and the Director placed in a position similar to that of the Astronomer Royal.

The draft was considered and approved for transmission to the Treasury, after amendment as follows :—

M.O. 5076.

Meteorological Office,
South Kensington, S.W. 7.
5th April, 1919.

SIR,

IN compliance with your request for the opinion of the Meteorological Committee upon the proposal to transfer the Meteorological Office from direct dependence on the Treasury to the Department of Scientific and Industrial Research, I am instructed to submit the following considerations on behalf of the Committee.

In reply to an inquiry as to the form of administration which the Department of Scientific and Industrial Research propose for the Meteorological Office the Committee have received a letter 6718/18 from which it appears that in place of the present Meteorological Committee with the Director as Chairman responsible only to the Treasury for the control of the funds placed at its disposal (with the Gassiot Committee of the Royal Society acting as an Advisory Committee for the work of certain physical observatories) the Department proposes to substitute—

(1) A Meteorological Board (of which the Director might or might not be Chairman) entrusted with the administration of the funds allocated for the Meteorological Office and presenting its annual programme and annual report to

(2) an Advisory Council for Geophysic Sciences consisting of seven or eight distinguished men of Science who after consideration would pass on the programme or report to

(3) the Committee of Council, a ministerial body responsible to Parliament for the vote for Scientific and Industrial Research.

The Meteorological Board.

The Committee submit that the transfer of the Parliamentary responsibility from the Treasury to the Committee of Council is not necessarily the occasion for altering the constitution of the governing body of the Office, that the administration of the Office under its existing constitution has been successful both as regards the discharge of its obligations to various departments of Government and to the general public and as regards its contribution to International Meteorology and the advancement of the Science. The Committee are therefore of opinion that the present constitution as set out in Treasury Minute of 20 May, 1905 should be retained. They think it advisable that the Director should continue to be the Chairman of the Administrative Committee and the powers of delegation included in the Minute should be maintained, as in no other way can the necessary association of initiative with responsibility be secured. The permanent division of responsibility between the Chairman, for the work of the Committee, and the Director, for the work of the Office, should not be contemplated

The other members of the Committee have been appointed by the Treasury, 1 the Hydrographer of the Navy representing the Admiralty, and

2 nominated by the Royal Society,
1 „ „ the Board of Trade,
1 „ „ the Board of Agriculture and Fisheries,
1 „ „ the Treasury,

and to these has recently been added a representative of the Air Ministry. The War Office has been represented temporarily by one of the representatives of the Royal Society.

Under the new Constitution the representative of the Treasury would naturally be replaced by a representative of the Committee of Council. In view of the importance of close association with the meteorological work of Colonial Governments it would be desirable that there should be a representative of the Colonial Office, and further in view of the prospective incorporation of the work of the British Rainfall Organization it would become desirable to have a representative of the Department concerned with water-supply, either the Local Government Board or the Ministry of Health. No other alterations seem to the Committee to be called for.

The Advisory Council.

It seems important to the Committee that the new Board should be directly responsible to the Committee of Council and not transmit its official communications through any other body as appears from the letter 6718/18 already referred to. At the same time there is an obvious opportunity of usefulness in the proposed Advisory Council of Geophysic sciences as advisory to the Committee of Council. There may appear to be only a formal difference between the Meteorological Board being in direct communication with the Committee of Council, and its communications being referred by the Committee of Council to an Advisory Council for comment, on the one hand; and the Meteorological Board presenting its communications in the first instance to the Advisory Council to be forwarded to the Committee of Council, on the other hand. But in course of time the difference might become a very real one, and as it is essential to preserve the responsibility of the Director and Board for all matters of policy and administration there ought to be no doubt about their right of direct communication with the Committee of Council.

There exists already an advisory body for geophysics in the shape of the Gassiot Committee of the Royal Society, appointed in accordance with an agreement between the Treasury and the Royal Society (1) to act as Trustees of the Gassiot Fund, and (2) to advise the Meteorological Committee as to the work of the physical observatories at Richmond (Kew Observatory), Eskdalemuir and Cahirciveen (Valencia Observatory). The Gassiot Fund represents the income of a sum of £10,000 given to the Royal Society in 1871 in trust for the maintenance of physical observations at Kew Observatory or at a substitute for it.

The Committee see no reason for terminating this arrangement and they submit that the agreement with the Royal Society should be continued, and since in this country the number of distinguished men of science conversant with geophysical work, in addition to the persons already officially connected with the administration, is small, they beg leave to suggest that the proposal might take the form that there should be an advisory council for geophysics consisting of eight members nominated one-half by the Royal Society, who would be the trustees of the Gassiot Fund, and one-half by the Department of Scientific and Industrial Research, and that this proposal should be offered to the Royal Society for their consideration.

The Removal of the Work of the Office to a more Central Position.

In the reply of the Department to the inquiry of the Meteorological Committee it is stated that "after transference to the Committee of Council it is contemplated that the Meteorological Office would be established in the neighbourhood of Whitehall, and that provision in the new offices would be made for officers of those departments of State which are most closely concerned in meteorological work to be accommodated, so that any departmental section for meteorology which it might be thought desirable to maintain, as distinct from the central service, should be linked up with that service in the closest possible manner."

The Committee cordially concur in the proposal to accommodate the various Meteorological Services in a single building as part of a scheme of co-ordination.

Apart from any consideration of the necessity of a central position, they cannot press the acceptance of their present quarters at South Kensington because there is not room there. They rent two floors, the roof, part of the basement and of the top floor from the Office of Works under a lease of 20 years from 1910, and for the accommodation of the increased staff during the war they have found it necessary to borrow temporarily from the Science Museum a large part of the top floor and also to occupy a house in Cromwell Road. With the developments that are in immediate prospect the accommodation required will be not less than double that which is included in the lease. So that in any case room must be found for a large part of the work elsewhere. The Committee therefore regard the proposal to share a building in a central position with the departmental Meteorological Services as very opportune.

The present building was specially designed to provide suitable accommodation for the library and facilities, which did not exist in Victoria Street, for a museum, lecture room, experimental workshop and physical laboratory, with the intention of developing a scheme of training and research of special character as a School of Meteorology forming part of a complete Meteorological Institute as understood in many European countries. For these necessary parts of meteorological organisation no other provision at present exists in this Country. It may therefore be desirable not to surrender the lease until suitable provision for the various activities of the Office have been arranged.

I am, &c.,
NAPIER SHAW.

The Secretary,
H.M. Treasury,
Whitehall, S.W. 1.

759. Physical Oceanography.—The Chairman reported that on examining the scientific work accomplished by the late Captain Hepworth it was clear that he had rendered a good deal of assistance in his private capacity, and using his official position, to various workers in physical oceanography, and after consulting the Hydrographer he suggested that arrangement should be made for incorporating the physical side, oceanography, temperature, salinity, ocean currents, waves, &c. with the work of the meteorology of the sea, and of making provision for it as far as possible.

Approved.

760. Office Staff.—*Salaries* (Minute 732).—The Acting-Director brought up the award of the Conciliation and Arbitration Board for Government Employees as to the salaries of civil servants, and general approval was given to the adoption of the findings as regulating the relation of the scales of salaries of the Office Staff to those in operation before the war.

NINETY-FOURTH MEETING.

South Kensington, S.W. 7, 28*th May*, 1919.

Present :

The DIRECTOR, in the Chair.

The Hydrographer. | Colonel Lyons.

Dr. Schuster.

761. The Minutes 752–757 of the Meeting of 26th March, 1919, and the Minutes 758–760 of the Meeting of 4th April, 1919, previously circulated in revise, were taken as read and confirmed.

The Chairman reported that he had been called upon to attend a meeting of the Home Affairs Committee of the War Cabinet on May 8th, to which the question of the transfer of the Office to the Department of Scientific and Industrial Research (Minute 758) had been referred by the Treasury, on receipt of the report of a Sub-Committee of the Research Committee of the Cabinet (R.C. 12) upon the question of the co-ordination of the Meteorological Services.

He had attended the meeting, and on receipt of a confidential proof of the minutes for correction, had invited the members of the Meteorological Committee to an informal meeting on May 14th in order that he might make a verbal report upon the position. Mr. Barstow, Colonel Lyons, Sir Thomas Middleton, and Dr. Schuster were present. The Hydrographer was absent in France.

A discussion took place on the situation as reported by the Chairman and Mr. Barstow, who was also present at the meeting of the Home Affairs Committee.

At the opening of the same meeting the Chairman also read the following letter from Colonel Lyons :—

Meteorological Office,
South Kensington, S.W. 7,
12th April, 1919.

My dear Shaw,

I think that it is now quite time that the Meteorological Committee terminated the arrangement made a year ago under Minute 705.

Every day now questions arise which affect the staff or the future policy of the Meteorological Office, and they should be dealt with by him who will carry them out. Already other Departments are asking for the services of members of the staff; arrangements have to be made with other Services who now meet one day one, and another day another, representative of the Meteorological Office, and this makes misunderstandings possible. The observatories as investigating stations of the Office should resume their serious work as soon as possible. All these matters you have had in hand.

Besides these, the stock of stores and instruments now held is valued at more than £10,000, which is too much for the finances of the Office, and the reduction of the stock must be made carefully if it is to be done economically. In my opinion all divisions of the Office need complete reorganisation to meet present requirements; new men have to be selected and trained, while six or seven on service, and who will have to be absorbed later, have to be borne in mind; the requirements of the War Office require careful consideration and organisation, also the replacing of the present military staff on ranges by a civilian staff is an urgent matter; there is also the further and larger question of war requirements.

All these matters require immediate attention, and though I have made what preparation I could they ought to be taken in hand seriously at once and carried through on a definite and progressive policy. There seems to be no need to wait for a decision as to the future controlling authority, since every delay weakens the position of the Meteorological Office as the State Service.

Yours very sincerely,
H. G. LYONS.

Upon the receipt of this letter following on a notification from Colonel Lyons on April 12th to the effect that his immediate demobilisation was likely, and he was therefore completing outstanding subjects, so far as possible, so that he could return all current work on orders reaching him from the War Office; the Chairman had thought it advisable to notify the Treasury that he would resume the administrative work of the Directorship and had resumed it on April 28th as notified to the Committee by letter of 3rd May, 1919.

762. CORRESPONDENCE.—**War Cabinet.**—*War Book* (Minute 739).—Reported—that a letter had been received from the Secretary of the War Cabinet asking for a return by 15th June, 1919, to a demand (K. 60, 15th July, 1916) from the Committee of Imperial Defence for information respecting operations during the war.

The Chairman announced that he had prepared a report on the work of the Office during the war and suggested that Colonel Lyons should undertake to draw up a similar report for the Meteorological Section R.E.

It was agreed that the report should be circulated to members of the Committee.

Advisory Committee for Aeronautics.—*Camera Theodolite* (Minute 753).—Read—the following extract from a letter from Mr. A. Mallock, M.O. 4913, stating on what terms he would undertake the preparation of working drawings for a camera theodolite :—

6, Cresswell Gardens, S.W.,
2nd April, 1919.

"THE terms on which I would undertake the design, and supervise the construction of a pair of Cameras such as were described in my note on the subject to the Advisory Committee for Aeronautics, are as follows :

1. A fee of £250.
2. That the work is to be carried out under my supervision by a firm chosen by me (probably Troughton & Simms and Munro).

It is difficult to estimate the cost of the work at the present time. At pre-war rates I should have said about £50 for each of the first Cameras.

The details of the design would take two or three months to complete, and I may add that the more completely the details are entered before the work is put in hand the less will be the cost of construction."

A. MALLOCK.

It was agreed to postpone the decision upon the proposal until the future arrangements for the Office are decided.

Admiralty.—*Distribution of Meteorological Messages* (Minute 753)—Reported—the following memorandum by the Hydrographer which appeared in Notices to Mariners (No. 880 of 1919) :—

WIRELESS METEOROLOGICAL INFORMATION TO AND FROM SHIPS AT SEA.

GENERAL REMARKS.

1. It is earnestly hoped that all concerned will assist in making the wireless meteorological service a success. Negotiations are now in hand to extend and unify the system of collecting weather data by wireless from ships at sea all over the world, and at the same time to organise the free transmission of weather bulletins from a sufficient number of wireless stations to admit of ships being constantly supplied with reliable weather reports and forecasts wherever they may be.

2. It should be borne in mind that the needs of ships at sea in regard to information regarding the weather will march hand in hand with the requirements of aircraft. The importance of this service will therefore be constantly increasing, and its success or failure will largely depend upon the co-operation of ships at sea in providing the data, without which accurate forecasting is impossible. The matter does not depend solely upon the efforts of the ships selected to furnish the data. The essence of success lies in rapidity in passing such data by wireless from the ships to the coast station,

and thence to the central meteorological office. It follows, therefore, that all ships not taking an active part in supplying data should use the greatest care not to interfere with the transmission of the wireless messages to the shore.

3. The following particulars refer to the scheme now being undertaken by the British Meteorological Office. This notice will, however, be subject to revision from time to time, and endeavours will be made to include in each revision all information available to date of the weather bulletins issued by the wireless stations of the world. Earnest endeavours are being made to obtain international agreement as to the form of these weather bulletins and to the methods and times of transmissions. It is hoped that the messages will eventually all be made in an international code at fixed times, so arranged that a ship with only one wireless operator will be able to read them. A similar scheme for time signals is being evolved.

Collection of Weather Data from Ships.

4. Certain ships are being asked to supply data regularly three times a day whenever they are within a certain distance of any one of some six or eight "observation points" in the North-Eastern Atlantic.

5. In addition to the regular observations, which are taken at 0100, 0700, 1300 Greenwich time, and sent as soon as possible to Malin Head (GMH) or Valencia (GCK) coast stations, these ships may, on request from either of these coast stations, send special data messages at other times.

6. The procedure for a ship which intends to send a data message will be as follows:—As soon as it has been decided to make the data message (*i.e.*, normally at about 0100, 0700, or 1300), the ship makes to "all ships" (CQ) the word "weather,"* followed by a number which indicates the "observation point" (see para. 4 above), near which she is at the time.

7. This warning message will not be answered by any ship or station; it is merely designed:—

(*a*) To inform all ships within range that a report is about to be made, and that they should therefore avoid interfering.

(*b*) To inform all other ships supplying weather data, which may be in the vicinity of the same observation point, that, one ship having decided to make a report, it is unnecessary for them to make one also.

8. About five or ten minutes after the ship has made the warning as above, she may be expected to transmit the data message itself. The normal or regular "*data message*" consists of four groups of five figures each; the special data message is of two groups of five figures each. All data messages bear the one word "weather"† as the address, and conclude with a "time of origin" of four figures. The message will be sent to Malin Head (GMH) or Valencia (GCK), according to the position of the "observation point."

9. It should be noted that several of the observation points are so far out at sea that the coast stations, although provided with extra sensitive receiving gear, will be unable to read the messages unless all ships help by keeping quiet. In particular, ships working near Malin Head or Valencia should be on the watch for the coast station making "Go on" (K) or "Repeat" (UD) to a ship whose transmission they cannot themselves hear. It is hoped that ships will so co-operate in this matter that it will be unnecessary to arrange international "silent periods" to enable these long-range data messages to be read by the coast stations.

10. The coast stations, on receiving these data messages, will possibly have to forward them to London by wireless. They would use continuous wave for this purpose, and would therefore not be heard by ships not fitted with special receivers. Ships should therefore be prepared to find that Valencia or Malin Head could not attend to calls for a few minutes after receipt of one of these data messages.

11. The "special" data messages referred to in paragraph 5 above are only made when the Meteorological Office finds its information pointing to the existence of peculiar conditions in a certain area. In such cases the office directs Valencia or Malin Head to ask for reports. The shore station then sends, to "any British ship supplying weather data,"‡ the word "weather"§ followed, if necessary, by the number of the observation point from which a special data message is desired. This word would not be answered by ships; but ships addressed, which were in the vicinity of any (or of the specified) observation point, would verify their position, make the warning signal to "All ships," take observations, and pass in the special data message as above described for the regular message.

Issue of Weather Bulletins to Ships.

12. A wireless Weather Bulletin may contain both or either of the following:—

(*a*) A Weather Report, which is an official statement of existing weather conditions; and/or

(*b*) A Weather Forecast, which is an official opinion of probable future weather conditions

13. The accompanying schedule of wireless weather bulletins is intended to provide, in a form suitable to give all information required by the wireless operator, a complete and up-to-date list of all weather bulletins transmitted at fixed times by wireless stations throughout the world. The same information will be found in detail in the Sailing Directions and in the international list of radio-telegraph stations (the Berne List).

14. The times given in the third column of the schedule are expressed in the 4-figure notation employed for signalling during the war. The term "G.M.T." here means the civil mean time of the meridian of Greenwich, with the day commencing at midnight and the hours reckoned from 00 to 23.

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* Application is being made to Berne to allot an international three-letter abbreviation to mean "Am about to make weather data from observation point number. . . ."

† Application is being made to Berne to allot international three-letter abbreviations to mean "Following are normal (or special) weather data."

‡ The call letters BVD are being given this signification.

§ Application is being made to Berne to allot an international three-letter abbreviation to mean "Please give special weather data (from observation point number. . . .").

15. Operators are reminded that Article 45 of the International Service Regulations imposes the general obligation of not interfering with reception of weather bulletins by other ships.

16. Certain other stations not shown in the schedule supply weather bulletins *on demand*, generally at reduced charges. Particulars will be found in the Berne List.

SCHEDULE OF WIRELESS WEATHER BULLETINS.

Wireless Station. (1.)	Call letters. (2.)	Time (G.M.T.) (3.)	Wave (Metres). (4.)
AUSTRALASIA:			
Adelaide Radio	VIA	0900, 1030	600
Brisbane Radio	VIB	1230, 1300	600
Hobart Radio	VIH	1200	600
Melbourne Radio	VIM	0930, 1100	600
Sydney Radio (Pennant Hills)	VIS		600
Awanui Radio	VLA	No details	No details.
Awarua Radio	VLB		
Wellington Radio	VLW		
Chatham Is.	VLC		
Macquarie Is. Radio	VIQ		
BRAZIL:			
Ilha do Governador	SOH	0000*	1800
CHINA:			
Shanghai—Zikawei	FFZ	0300,* 0900	600
FRANCE:			
Eiffel Tower	FL	0945†, 2330*	2500
FRENCH OCEANIA:			
Papeete, Ile Tahiti	FOP	1100, 2300	600
GERMANY:			
Norddeich	KAV	1200,* 2200	1650
GREAT BRITAIN:			
Poldhu‡	MPD	0930, 2130	2700
Cleethorpes‡	BYB	0500, 1700	3000
HAWAIIAN IS.:			
Pearl Harbour	NPM	0230, 0630 / 1830, 2230	600
HOLLAND:			
Scheveningen	PCH	1115, 2315	1800
INDIA:			
Calcutta Radio	VWC	0730,* 1910	2000
Karachi Radio	VWK	0730, 1910	2000
Rangoon Radio	VTR		1200
Bombay Radio	VMB	0740, 1920	2000
Madras Radio	VWM		2000
Port Blair	VTP		1200
JAPAN:			
Choshi	JCS	1200*	600
Dairenwan	JDA	1200	600
Fukkukaku	JKF	1130	600
MEXICO:			
Campeche	XAB	1837*	600
Guayamas	XAH		
Mazatlan de Sinaloa	XAE		
Payo Obispo	XAC		
Vera Cruz	XAA		
SAMOA:			
Tutuila	NPU	0330, 0730 / 1930, 2330	600
SOUTH AFRICA:			
Cape Town Radio	MNC	1115	600
Durban Radio	VND	1115	600
SPAIN:			
Madrid	EGG	1330	2000
UNITED STATES:			
Washington	NAA	0300*	2500
Key West	NAR	0300*	1500
S. Francisco	NPH	0600*	600 & 950
North Head	NPE	0600	600 & 950
S. Diego	NPL	0600	600 & 950

This notice will be subject to revision from time to time.

By Command of their Lordships,

J. F. PARRY,
Hydrographer of the Navy.

* Weather bulletin follows a time signal.
† Weather bulletin is followed by time signal.
‡ Will be started shortly.

Reported also—the receipt of the following R.A.F. Scheme for Meteorological Wireless Reports enclosed with a letter (M.O. 1969) from Captain J. A. Slee, of the W/T Board, Admiralty :—

R.A.F. METEOROLOGICAL SCHEME—WIRELESS.

The following is an outline of the proposed scheme :—

GENERAL.—Twenty-eight stations have been selected to cover the British Isles. Each of these will be equipped with W/T transmitting and receiving apparatus suitable for its requirements.

These stations are divided into five groups of five or six stations One station in each group will act as Group H.Q. station for communication with London H.Q. station. London H.Q. station will act as Group H.Q. station for the stations in the London Group.

Communication between stations and Group H.Q.'s will be on long wave C.W. (1,600 metres to 1,720 metres).

Communication between Group H.Q. and London H.Q. will be on short wave C.W. (450 metres to 520 metres).

The grouping of stations is shown on the attached map and table, long wave W/T intercommunication being marked in red and short wave in green.

Distances in miles between stations and Group H.Q., and between Group H.Q. and London H.Q., are shown in brackets after each station's name on the table.

APPARATUS.—

TIMES OF TRANSMISSION.—Messages, properly coded for transmission, should be at each W/T station not later than 0100 and 1300.

Transmission of these messages from stations to Group H.Q. will be carried out between the hours 0100–0120 and 1300–1320.

The messages for transmission from Group H.Q. stations to London H.Q. should be ready not later than 0120 and 1320 and transmitted between the hours 0120–0145 and 1320–1345.

PROCEDURE.—Group H.Q. stations will control the working of all stations in their groups.

Commencing at 0100 and 1300, the Group station will call each station in turn and give the signal to proceed with the transmission of its message.

The usual W/T procedure will be carried out.

Commencing at 0120 and 1320 the London H.Q. station will call each Group station in turn and messages will be transmitted.

London H.Q. station will control the working of Group H.Q. stations.

CALL SIGNS.—These are shown on the attached table.

PERSONNEL.—Each station will require at least 2 W/T operators trained in C.W. ground intercommunication, and 1 electrician (for upkeep of electrical gear).

Total, 56 W/T operators and 28 electricians.

METEOROLOGICAL DETAILS.—To be arranged by Meteorological Department.

Copy of code to be used is attached.

TRANSMISSION TO CARNARVON AND AMERICA.—A meteorological report (prepared from data collected from the above stations) will be passed to Carnarvon by the Marconi's Company's direct L/T for transmission by W/T to America at 0230 and 1430.

R.A.F. WIRELESS SYNOPTIC MESSAGES.

Arrangement of Message :—

The message will consist of not more than 45 groups of figures. There will be an identification group of three figures followed by two or more (not exceeding four) groups of five figures.

The first group : three figures give the station to which the information refers. See attached identification list.

The second group consists of five figures and has the following significance :—

B B B D D.

Where B B B = Barometer in millibars and tenths.
D D = Wind direction in points.
(08 = Wind E)
(16 = Wind S, etc.)

The third group consists of five figures and has the following significance :—

F w β b b

Where F = Surface wind velocity in miles per hour (*see* Code I.).
W = Present weather (*see* Code II.).
β = Characteristic of tendency of barometer during previous three hours (*see* Code III.).
b b = Amount of rise or fall of barometer in half-millibars during previous three hours. 50 added for fall.

The fourth group consists of five figures and has the following significance :—

H D D V V.

Where H = Height in thousands of feet.
D D = Direction in points (as above).
V V = Velocity in miles per hour.

The fifth group consists of five figures and is similar to the fourth group except that H if 0 equals 10,000 feet.

CODE I.

Surface Wind Force—

0 —	Wind	between	0	and 4	m.p.h. inclusive.
1 —	„	„	5	and 9	„ „
2 —	„	„	10	and 14	„ „
3 —	„	„	15	and 19	„ „
4 —	„	„	20	and 24	„ „
5 —	„	„	25	and 29	„ „
6 —	„	„	30	and 34	„ „
7 —	„	„	35	and 39	„ „
8 —	„	„	40	and 44	„ „
9 —	„	„	45	and 50	„ „

For winds above 50 m.p.h., 50 to be added to wind direction and the amount over 50 m.p.h. is indicated as before.

CODE II.

Present Weather—

0 — Sky quite clear.
1 — Sky a quarter clouded.
2 — Sky a half clouded.
3 — Sky three-quarters clouded.
4 — Sky overcast.
5 — Rain falling.
6 — Snow.
7 — Haze, light fog or mist.
8 — Fog.
9 — Thunderstorm

CODE III.

Characteristic of Barometer tendency—

0 —	*B*arometer	steady.
1 —	„	unsteady.
2 —	„	rising continuously.
3 —	„	falling continuously.
4 —	„	falling at first, now rising.
5 —	„	steady at first, now rising.
6 —	„	steady at first, now falling.
7 —	„	fall checked, now nearly steady.
8 —	„	rise checked, now steady falling.
9 —	„	no observation.

Example I.—

115 97822 54651 12430 32635

East Fortune, barometer 997·8 millibars. Wind WSW, wind velocity between 25 and 29 m.p.h. Overcast sky, barometer steady at first, now falling. Amount of fall during previous three hours, one-half millibar.
Wind at 3000 feet WNW, 35 m.p.h.

Example II.—

151 04668 12206 12012 52214

Polegate, barometer 1004·6 millibars. Wind SSW, wind velocity between 55 and 59 m.p.h. Sky a half clouded, barometer rising continuously, amount of rise during previous three hours 6 half-millibars.
Wind at 1000 feet SW, 12 m.p.h.
Wind at 5000 feet WSW, 14 m.p.h.

Example III.—

191 00512 20802 20802 00815

Whiddy Island, barometer 1000·5 millibars. Wind SW, wind velocity between 10 and 14 m.p.h. Sky clear, barometer rise checked, now steady or falling. Amount of rise during previous three hours, one millibar.
Wind at 2000 feet E, 8 m.p.h.
Wind at 10,000 feet E, 15 m.p.h.

The wireless message will be sent at 0230 and 1430 G.M.T. and will refer to observations taken at 0100 and 1300 G.M.T.

A map is attached showing the exact positions of the stations included in the identification list.

AIR MINISTRY, F.O. 5.

R.A.F. METEOROLOGICAL STATIONS.

Identification List for use with Synoptic Messages.

Station.	No.	Station.	No.
Fair Island	103	Stonehenge	155
Noup Head	105	Isle of Wight	157
Houton Bay	107	Moreton	159
Longside	109	Portland	161
Montrose	111	Plymouth	163
Fifeness	113	Mullion	165
East Fortune	115	Lundy Island	167
St. Abb's Head	117	Pembroke	169
Cramlington	119	Fishguard	171
Seaton Carew	121	Turnhill	173
Flamborough Head	123	Anglesey	175
Howden	125	Barrow	177
Barlow	127	Luce Bay	179
Killingholme	129	Inchinnan	181
Cranwell	131	Malin Head	183
Bircham Newton	133	Baldonnel	184
Yarmouth	135	Dublin	185
Pulham	137	Wexford	187
Bedford	139	Queenstown	189
Orfordness	141	Whiddy Island	191
Felixstowe	143	Valencia	192
Hendon	145	Cranmore	193
Grain	147	Stornoway	195
Capel	149	Castlebay	197
Polegate	151	Blacksod Point	199
Calshot	153		

AIR MINISTRY, F.O. 5.

NOTE.—The special information available by wireless at Newfoundland for the competition for the prize offered by the *Daily Mail* is set out in M.O. 07436.

Reported—that a communication (M.O. 5251) had been received from Lieut. Grant, of the Hydrographic Department of the Admiralty, enclosing a copy of the following memorandum drawn up by the Hydrographer :—

W/T B. 264/19.—M.O. 5251.

W/T Board,
c/o Admiralty, S.W. 1,
27th March, 1919.

Distribution of Meteorological Messages.

Several papers have been addressed to the W/T Board from the three Services on the subject of the distribution of meteorological messages by W/T, and it seems this matter could be much simplified if the Offices who originate such messages could be to some extent centralised

It is understood that this matter is under consideration by the Cabinet.

2. In order to simplify discussion the following definitions of the different types of meteorological messages have been accepted :—

(*a*) A *data message* conveys the results of actual observations made at any one place. (Note : This will usually consist of group of figures.)

(*b*) A *synoptic message* is a collection of data messages and only affects the Meteorological Services. It is necessary for the preparation of local weather bulletins.

(*c*) A *weather bulletin* may contain both or either of the following :—

(i) A *weather report*, which is an official statement of existing weather conditions and/or

(ii) A *weather forecast*, which is an official opinion of probable future weather conditions.

(NOTE.—Weather bulletins will be in plain language or in International code.)

3. Of the above it is fairly simple to arrange for data messages from shore observatories in the United Kingdom and from ships in N.E. Atlantic to be transmitted by W/T (where such is necessary) to some central headquarters.

4. From these data messages synoptic messages will have to be built up, and it appears that at this moment the requirements are as follows :—

The Meteorological Office require such messages to reach Paris and America (also Scandinavia, Low Countries, Italy, etc.).

The War Office require them to reach the Rhine front and North Russia.

The Air Ministry require them to reach America and all countries to, from, or through which flying by British aircraft will take place, especially France and the Mediterranean.

In all the above cases speed is essential.

It is believed that all the above requirements could be met by one single synoptic message prepared by one Department provided that Department received data messages from a sufficient number of sources.

5. The Marconi W/T station at Carnarvon is best adapted to send these synoptic messages, and has sufficient power to meet all immediate requirements.

6. It would appear possible to frame these synoptic messages in such a way as to satisfy the requirements mentioned above provided an agreement can be come to as to :—

(*a*) The times at which these synoptic messages are to be sent.
(*b*) The information which they are to contain.
(*c*) The "Code" to be used.
(*d*) The Department responsible for making them out.
(*e*) The Department which is to bear the charge.

7. With regard to Weather Bulletins, it is understood that at least four types may be required, viz.:

(1) For use at Aerodromes,
(2) For use by Armies,
(3) For use by Ships,
(4) For general civilian use on shore—

and it is presumed that (1), (2), and (3) would be prepared by the Air Ministry, War Office, and Admiralty Meteorological Services severally, while (4) would presumably be prepared by the Meteorological Office.

8. The distribution of these Bulletins appears to be a purely Departmental affair, in which the W/T Board will only be concerned to co-ordinate the work of the Departments using W/T so as to assure that the W/T services do not interfere with one another or with other established services.

9. It appears that the present difficulties would be overcome if the following principle could be accepted by all concerned :—

All weather data collected from all sources must be sent to one single Department which is responsible for framing and despatching synoptic messages to other countries, to the home Departments, and to the British meteorological stations which prepare weather bulletins.

10. It is admitted that the bulk of the problems referred to above are outside the scope and duties of the W/T Board, but in the present state of uncertainty it is difficult, if not impossible, to frame a proposal which could adequately meet the requirements, both departmental and international, with which the W/T Board is at present confronted.

11. It is therefore suggested that steps might be taken by the Departments concerned to clear up the matter as set forth in par. 6.

12. It is suggested that the Secretaries of the Air Ministry and War Office should communicate the views of their Ministries to the Secretary of the Admiralty, for the Hydrographer, with a view to concerted action being taken.

13. If the W/T Board could be informed of the decision reached, the necessary W/T arrangements could rapidly be arrived at.

JOHN A. SLEE,
Head of W/T Board.

The Secretary,
Admiralty,
War Office,
Air Ministry.

Comité d'Action des Services Météorologiques Français (Minute 749).—Reported—that in correspondence with the President of the Comité d'Action several dates had been suggested for the proposed conference of the Inter-Allied nations, and that the end of September or the first week in October seemed the most suitable.

It was agreed that endeavour should be made to hold a conference in that week, and that representatives of the various States of the Empire should be invited to a meeting to precede the conference in Paris. With regard to the presence of neutral nations it was understood that no official action would be taken by the French Government until the decision of the meeting of the Geophysical Union at Brussels, to be held on 16th July, 1919, had been announced. The Director would, however, as President of the old International Committee, convoke an informal meeting of the allied and neutral members of the Committee early in July.

Treasury.—*Organisation of Meteorological Services* (Minute 761).—Reported—the following letter :—

13262/19.—M.O. 6281.

Treasury Chambers,
1st May, 1919.

SIR,

I AM directed by the Lords Commissioners of His Majesty's Treasury to transmit herewith, for your information, copy of a Report dated 18th March last, which they have received from the Research Committee of the War Cabinet, on the question of the organisation and co-ordination of the Meteorological Services of the country.

I am to add that My Lords propose at an early date to bring before the Home Affairs Committee of the Cabinet (*cf.* Minutes of 21st November, 1918) the question of the future constitution of the Meteorological Office and its relation to other Departments.

I am, etc.,
T. L. HEATH.

The Director,
Meteorological Office.

Reported also—that a secret letter (M.O. 7418) had been received from the Secretary of the War Cabinet enclosing a copy of Conclusion 1 from the Minutes of a meeting of the Committee of Home Affairs, held on Thursday, 8th May, 1919. The following reply, previously circulated, was approved for transmission to the Treasury after amendment :—

Meteorological Office,
South Kensington, S.W. 7,
29th May, 1919.

SIR,

THE Meteorological Committee have received from the War Cabinet, for information, a copy of Conclusion 1 from the Minutes of a Meeting of the Committee of Home Affairs, held on Thursday, 8th May, 1919, as follows :—

"The Committee decided—

"That the Meteorological Service be co-ordinated on the lines set out in the recommendations of the Sub-Committee of the Research Committee (R.C. 12, G.T. 7173) and be attached to the Air Ministry. All other Departments, including the Meteorological Office, to be adequately represented."

The Committee note that the recommendations of the Sub-Committee of the Research Committee (R.C. 12, G.T. 7173), which have been approved, had in view a constitution for the central Meteorological Service, which included a Board responsible to Government for the administration of the Office in the same way as the Meteorological Committee is now.

The Sub-Committee offered no opinion as to the choice between the two alternatives of making the Board responsible to the Committee of Council or the Air Minister. The second part of the conclusion of the Committee of Home Affairs under reference decides that point by attaching the Service to the Air Ministry.

The Committee therefore understands :—

(1) that the Meteorological Service of the Air Ministry will in future become a part of the Central Meteorological Service in the general charge of the Director of the Meteorological Office, who will become responsible to the Air Ministry through the above-mentioned Board for the meteorology of the Air Service, and will also be responsible to the Air Ministry through the Board for satisfying the meteorological requirements of the general public and of all the Departments of Government requiring meteorological information.

(2) that provision will be made for the accommodation of the staff of the enlarged Meteorological Service in some central position, and that accommodation will also be provided in the same building for an officer or officers of the separate Meteorological Service of the Navy and (if necessary) of the Army, with facilities of access to all meteorological information available.

The principle of the scheme for the administration of the Office, which has been in force with marked success since 1905, is to bring all the operations of the Office under the review of a single body, which included not only representatives of the interests of the several Departments of State, but also representatives of the Royal Society, in the interest of the scientific development of the various branches of the work The Committee attach great importance to this provision on account of the many-sided aspects of the science of meteorology.

Special provision also exists for the joint interest of the Royal Society and the Meteorological Office in the geophysical subjects allied to meteorology and associated with it at some of the observatories of the Office. Provision should be made in the new arrangement for safeguarding these associations.

The various obligations of the Meteorological Service have been set out in the correspondence between the Meteorological Office and the Department of Scientific and Industrial Research, which has been reported to the Committee of Home Affairs. The various points should be taken up in formulating the arrangement with the Air Ministry.

It is highly desirable that before any transfer or amalgamation takes place decisions should be reached on a few principal questions, of which the following may be enumerated :—

(1) Is the present meteorological staff of the Air Ministry to be combined with that of the Meteorological Office ? What, in that case, are to be the grades, salaries, and conditions of service of the joint staff ?

(2) Is the Council, Committee, or Board referred to an Advisory or Executive body ? What is to be its composition ? What will be its powers and duties ?

(3) With regard to financial provision, in view of the great variety of the undertakings of a central Meteorological Service, it is desirable that the votes for the Office should form a separate chapter of the Air Ministry Estimates.

(4) And for similar reasons, correspondence should pass the Meteorological Central Registry and not the Ministry Registry only.

(5) Adequate accommodation should be provided.

I am to point out that the provision of the necessary accommodation is an urgent question, upon which the success of the proposed scheme is contingent. It has become the more urgent because the Director of the Science Museum asks for the return of the rooms of the top floor of the present building, which were borrowed during the war for the accommodation of the Forecast Division of the Office.

I am, &c.,
NAPIER SHAW.

The Secretary,
H M. Treasury.

Edinburgh Royal Society.—*Development of Meteorology in Scotland.*—Reported—that a copy of the following letter (M.O. 5651) from the President of the Royal Society

of Edinburgh to His Majesty's Secretary for Scotland had been received from the General Secretary of the Royal Society of Edinburgh :—

Royal Society of Edinburgh,
22, George St.,
21st Feb., 1919.

SIR,

THE position of Meteorology in Scotland has been occupying the attention of the Council of this Society, and I beg leave to bring the matter to your notice.

During the war there have been considerable advances in Meteorological knowledge and in its importance to the public. This is well evidenced by the fact that the *Times* and the *Morning Post* daily devote a considerable amount of space to the weather.

In Scotland the present position is that the Scottish Meteorological Society, which is a voluntary association, acts to some extent as a branch office in Edinburgh of the Meteorological Office, London. It undertakes the maintenance of a system of climatic and rainfall stations : the material thus collected is made available to the State Meteorological Office ; and in return for services rendered and obligations undertaken the Society receives an annual grant from that Office of £350, increased during the current year to £410. This payment is incommensurate with the value of the services rendered to the State, and it leaves no margin for increase in the distribution of available information to the public, nor for improvement in methods of observation.

I am informed that the State Meteorological Service is at present in process of reconstruction, and the time therefore seems opportune to present the Scottish point of view. The Council of this Society are strongly of opinion that any scheme should include an establishment in Edinburgh on such a scale as would secure for Scotland an adequate daily distribution of weather information, such as is possible in England from London as a centre, and also the development of upper air research.

I therefore make an urgent appeal to you to ensure that Scottish interests receive the fullest consideration at the present time, and that this Society be consulted by those appointed to deal with reorganisation. I further suggest :—

(1) That if the present Meteorological Committee be continued, the Royal Society of Edinburgh should have one representative on it. The Royal Society (of London) nominates two members.

(2) That if some other controlling body than the present Meteorological Committee be in contemplation, Scotland should have representatives on it, nominated by the Royal Society of Edinburgh.

I shall be obliged if you will treat this letter as of immediate urgency.

I am, &c.,
J. HORNE,
President.

War Office (Minute 739).—Read—the following correspondence :—

Gen. No. 6/5843. A. 4.—M.O. 6213.

War Office,
Whitehall, S.W. 1,
30th April, 1919.

SIR,

I AM commanded by the Army Council to refer to the previous correspondence contained in 57/Gen. No./9203, S.D. 2, in the matter of the employment of trained Meteorologists at Shoeburyness, Chapperton Down, and Porton, and to request that the following appointments may be made, if concurred in, namely Captain D. Brunt, R.E., and Mr. N. K. Johnson to Shoeburyness, Captain Durward, R.E., and Mr. Smith to Chapperton Down, and Mr. Britton to Porton, but to remain at Shoeburyness until his services are required at the latter place. I am to say that it is considered advisable that any of these gentlemen who are holding temporary commissions or are temporarily in the Army should be demobilised as early as possible.

I am also to ask that 12 civilian assistants may be sent to Shoeburyness and six to Chapperton Down to take the place of the R.E. staff who are now employed on these duties. Three more will eventually be required at Porton.

I am, &c.,
B. B. CUBITT.

Director of Meteorological Office,
South Kensington.

M.O. 6341.

Meteorological Office,
South Kensington, S.W. 7,
5th May, 1919.

SIR,

IN reply to your letter Gen. No. 6/5843 A. 4 of 30th April, 1919, I beg leave to report that the appointments requested have been made, viz. :—

Captain D. Brunt	... ...	Assistant Superintendent.
Mr. N. K. Johnson	... ...	Professional Assistant.
Mr. N. H. Smith	... ...	Professional Assistant.
Mr. C. E. Britton	... ...	Professional Assistant.

The appointments of Captain Brunt and Mr. Britton date from demobilisation, those of the others are already operative.

There is no objection on the part of this Office to the demobilisation of the officers holding temporary commissions. Colonel Lyons, who is still in charge of the Meteorological Services of the Army, will be able to say whether any technical objection arises to their demobilisation before the personnel of the civilian staff is completed (in connection with the organisation of the staff at the Artillery Ranges).

With regard to the provision of 12 civilian assistants to be sent to Shoeburyness and six to Chapperton Down to take the place of the R.E. staff who are now employed on these duties, I note that in the estimates of the expenses of this Office in the year 1919–20, approved by Treasury letter of 13th February, 1919, provision was made for 13 civilian technical assistants for the Meteorological Services of the Army. For these the N.C.O.'s of the Meteorological Section, R.E., who are fully qualified, are not generally available, because they were for the most part recruited from among University graduates with scientific training and would not accept appointments in a civilian clerical, or technical staff. Some of those who were recruited from this Office are still employed with the Armies of Occupation in France and Russia. I have the names of two who may be available, viz. :—

A. H. Lupton, who is already at Shoeburyness, and C. V. Ockenden, who has returned from Salonika and is still under Colonel Lyons' orders, and is, I understand, not yet entitled to be demobilised because he did not join till 1916.

We cannot draw further upon the Office staff because all the available men were recruited and replaced by women, and we have, therefore, to select suitable candidates for training. This is already proceeding: *four* are already in training (H. D. K. Millar, P. W. Dingle, P. R. Zealley, T. H. Applegate), of whom two may be sent to Shoeburyness or Chapperton very speedily. Others will be appointed and trained as quickly as possible.

In a memorandum which Colonel Lyons gave me on April 28th, he mentioned 16 as the number of technical assistants required for work on Artillery Ranges in place of 13 as set out in the estimate; and your letter under reference gives 12 for Shoeburyness, 6 for Chapperton Down, and 3 eventually for Porton. The total is thus 18 or eventually 21 in place of the 13 originally mentioned. This will imply an addition to the expenditure beyond the estimate at the rate of about £1,100 a year. I trust that in the prospective reorganisation of the Office it will be possible to provide for the addition without going to the Treasury. Should a further application in that quarter become necessary, I will communicate with you further and ask for the support of the Army Council, but in the meantime we shall proceed with the appointments.

I am, &c.,
NAPIER SHAW.

The Secretary,
Army Council,
War Office, S.W.1.

763. BRITISH RAINFALL ORGANIZATION (Minute 751).—Reported—that at the request of the Treasury Solicitor (Sir Alexander Lawrence) the Director had attended at the Treasury on 20th May for a consultation with respect to the draft deed of transfer of the property of the Organization prepared by Messrs. Druces and Attlee and had subsequently ascertained from the latter that the vendors would not be content with a Government annuity in lieu of the sum equivalent thereto as expressed in the correspondence.

764. ANNUAL REPORT, 1918–1919.—Reported—that the preparation of the Annual Report to the Treasury was in progress.

It was agreed that a note of thanks should be prepared, for circulation to those to whom the thanks of the Committee were due for special services rendered during the war, in the form of an extract from the Annual Report.

765. OFFICE STAFF.—**Obituary.**—Reported—the death of Mr. Richard H. Curtis at his residence, 30, Landford Road, Putney, on 21st May. Mr. Curtis, who joined Admiral Fitz-Roy's Office for the Daily Weather Service in 1861, was subsequently engaged in the work of reproducing in facsimile the records of the seven Observatories of the Office under Sir Francis Galton, and ultimately held the position of Superintendent of the Instruments and Observatories Branch from July, 1907, until his retirement in March, 1912 (Minute 329).

It was agreed to send a letter of condolence, on behalf of the Committee, to his widow.

The late Captain Hepworth (Minute 754).—Reported—the receipt of a letter from the Director of the Danish Meteorological Institute expressing, on behalf of the Institute, sympathy and regret on account of the loss of the late Captain Hepworth.

H. Harries (Minute 695).—Reported—a letter (M.O. 5541) from Mr. H. Harries, at present Acting-Superintendent of the Marine Division, asking for an increase of salary in consideration of his promotion to Acting-Superintendent.

It was agreed that his salary should be increased to £500 per annum (inclusive of war bonus) as from 1st May, 1919.

L. F. Richardson (Minute 754).—Submitted the following memorandum :

The sum of £450 has been set aside for 1919–20 as a retaining fee for Mr. Richardson's services. Mr. Dines has expressed his willingness that the work should be continued at Benson.

In order to put the arrangements on a definite footing the following are put forward for approval:—

(1) That the facilities of the Observatory at Benson, under the direction of Mr. Dines as Director of Experiments upon the Upper Air, be placed at the disposal of Mr. L. F. Richardson for the purpose of experiments with a view to Forecasting Weather by Numerical Process.

(2) That such further facilities as the Office may be able to afford with regard to observation, computation, or other technical assistance be provided in connexion with the Observatory at Benson under Mr. Dines's direction. Requisitions for stores required should be made through Mr. Dines and the cost included by him in the expenses of the Observatory.

(3) That £450 be assigned to Mr. L. F. Richardson as a retaining fee or salary for his services as Superintendent of Experiments in Prediction by Numerical Process in the year 1919–20, the salary to be payable in quarterly instalments dating from 1st April, 1919.

(4) That periodical reports on the progress of the experiments be submitted to the Office through the Director of Experiments on the Upper Air at Benson to be included with the regular reports of work.

(5) That the development and supervision of the manufacture by a firm of instrument makers, or otherwise, for supply to the Observatories of the Office of the instruments exhibited to the Royal Society on March 6th, 1918, be included in Mr. Richardson's duties.

(6) In the preparation of the estimates for 1920–21 the Office will decide whether further provision shall be made for the prosecution of the inquiry.

Approved.

M. T. Spence (Minute 754).—Reported—that at the request of the Deputy-Director of Communications (M.O. 6882) arrangements had been made for Mr. M. T. Spence to be temporarily transferred to the Air Ministry for duty with Airship R. 34.

Reported also—that the Air Ministry declined to take any responsibility with regard to compensation in the event of disablement, and that inquiry was being made from the Treasury to ascertain whether Treasury Warrant of 17th January, 1919 (Superannuation Act, 1887), was applicable to members of the Staff of the Meteorological Office.

Resignations.—Miss V. Simon (Minute 723).—Reported—that the resignation of Miss V. Simon, Probationer in the Statistical Division, had been accepted as from May 10th, 1919.

Miss M. Coysh (Minute 723).—Reported—that the resignation of Miss M. Coysh, Probationer in the Statistical Division, had been accepted as from 17th May, 1919.

Promotions.—W. J. Tomkins (Minute 754).—Recommended—that Mr. W. J. Tomkins, Supernumerary Clerk in the Statistical Division, be promoted to Staff Clerk at a salary of £125, with normal war bonus, the promotion to date from 1st June, 1919, on his transfer to the Forecast Division.

Miss M. Enderby (Minute 623).—Recommended—that Miss M. Enderby, Girl Clerk in the Statistical Division, be informed that on the termination of her period of service as Girl Clerk on 17th August, 1919, she will be promoted to Clerk Computer at a salary of £75 per annum, with normal war bonus.

Approved.

New Appointments.—Reported—the following Director's Orders for confirmation:—

Order 814 appointing **Charles Henry Kellett** Junior Professional Assistant, at a salary of £150 per annum and normal war bonus. The appointment to date from 24th April, 1919, and to be terminable by three months' notice on either side.

Order 815 appointing **Nelson King Johnson**, B.Sc., Senior Professional Assistant, at a salary of £225 per annum, with normal war bonus. The appointment to date from 28th April, 1919, and to be terminable by three months' notice on either side.

Order 811 appointing **Charles William Lamb**, B.Sc., Junior Professional Assistant, at a salary of £175 per annum, with normal war bonus, with annual increments of £15. The appointment to date from 10th April, 1919, and to be terminable by three months' notice on either side.

Order 817 appointing Sergt. **Charles Ernest Britton**, R.E., Junior Professional Assistant, at a salary of £150 per annum, with normal war bonus. The appointment to date from 1st May, 1919, or from the date of demobilisation, and to be terminable by three months' notice on either side.

Order 833 appointing **Reginald Percy Batty** Junior Professional Assistant, at a salary of £200 per annum, with normal war bonus, for duty at Chapperton Down. The appointment to date from demobilisation and to be subject to three months' notice on either side.

Order 841 appointing **Roger Alan Watson**, B.A., Junior Professional Assistant at Eskdalemuir, at a salary of £200 per annum, with normal war bonus. The salary to be increased to £225, with normal war bonus, at the end of the year on his promotion to Senior Professional Assistant. The appointment to date from 2nd June, 1919, and to be terminable by three months' notice on either side.

Order 819 appointing **Arthur Walter Lloyd** Staff Assistant, for duty in connection with the Meteorological Services of the Army, at a salary of £175 per annum, with normal war bonus, rising by £7 10*s.* a year to £200. The appointment to be subject to three months' notice on either side.

Order 836 appointing **William John Richard Pook** Clerk Assistant at a salary of £105 per annum, with normal war bonus. The appointment to date from 16th June, 1919, to be subject to three months' notice on either side.

Order 810 appointing **Percy Raymond Zealley** for a probationary period of three months' training at Kew Observatory at a salary of £75 per annum, with normal war bonus, with annual increments of £7 10*s.* per annum. The appointment to date from 7th April, 1919.

Order 809 appointing **Percy William Dingle** for a probationary period of three months' training at Kew Observatory at a salary of £75 per annum, with normal war bonus, with annual increments of £7 10*s.* per annum. The appointment to date from 7th April, 1919.

Order 818 appointing **Cyril Alan Grant** technical assistant for duty in connexion with the Meteorological Service of the Army for six months, and thereafter in one of the establishments of the Office, at a salary of £100 per annum, with normal war bonus. The appointment to date from 8th May, 1919.

Order 820 appointing **Richard George Veryard** technical assistant for duty in connexion with the Meteorological Service of the Army for six months, and thereafter in one of the other establishments of the Office, at a salary of £85 per annum, with normal war bonus, the salary to be increased to £92 10*s.* on his 21st birthday, 6th October, 1919. The appointment to date from 19th May, 1919.

Order 827 appointing **Edward Stanley Wood** Probationer in the Meteorological Service, with a view to his taking up duty as technical assistant in connexion with the Army Meteorological Service, at a salary of 20*s.* 6*d.* per week, with normal war bonus during probation, and £75 per annum, with normal war bonus, as technical assistant. The appointment to date from 2nd June, 1919.

Order 834 appointing **William Leslie Andrew** technical assistant for training at Kew Observatory at a salary of £92 10*s.* per annum, with normal war bonus. The appointment to date from 2nd June, 1919, and to be subject to three months' notice on either side.

Order 837 appointing **Harry William Ellis McDonald** technical assistant for duty with the Army Meteorological Service at a salary of £85 per annum, with normal war bonus. The appointment to date from 2nd June, 1919, and to be subject to three months' notice on either side.

Order 835 appointing **Conway Vaughan Starr** technical assistant for training at Kew Observatory at a salary of £82 10*s.* per annum, with normal war bonus. The appointment to date from 2nd June, 1919, and to be subject to three months' notice on either side.

Order 808 appointing **George Thomas Smith** Probationer in the Statistical Division at a salary of 19*s.* a week and normal war bonus. The appointment to date from 14th April, 1919.

Order 816 appointing **Thomas Howard Applegate** Probationer for training at Kew Observatory at a salary of 20*s.* 6*d.* per week, with normal war bonus. The appointment to date from 2nd May, 1919.

Order 824 appointing **Sydney Victor Upson**, Boy Clerk, with wages of 13*s.* a week, with normal war bonus. The appointment to date from 26th May, 1919.

Order 826 appointing **Richard Jones Williams** Probationer in the Statistical Division at a salary of 17*s.* 6*d.* per week, with normal war bonus. The appointment to date from 29th May, 1919.

Approved.

Reappointment.—Reported—that Mrs. E. G. Bilham rejoined the Office Staff as Clerk Computer for duty in the Library on May 19th, 1919; resuming at the salary, with war bonus, corresponding with her seniority from the date of her previous employment at the Office.

Forecast Division.—*Special payments for work at irregular hours.*—Submitted—the following memorandum :—

Members of the Staff of the Forecast Division have been entitled to additional salary at the rate of 25 per cent. as representing the traditional payments for "overtime" made up when the attendance of the forecast staff was alternately 12 hours and 6 hours. The 25 per cent. applied in the case of Technical and Clerical Assistants and Probationers and Boy Clerks.

At the time the 25 per cent was fixed the attendance was for the full Sunday duty as well as week day, but no special provision of additional pay was made for night duty. At first night duty was carried on by the Superintendent and Professional Assistants, who had no special allowance for duty outside ordinary office hours.

Objection has been raised to the present system partly on the ground that the allowance is not adequate for night duty and partly because the payment at a uniform rate for the various members of the Staff is inequitable, if there is not exact equality in the number of attendances at extraordinary hours. It is, therefore, proposed to revert to the practice of paying according to the attendances made.

For this purpose the salaries of the members of the Forecast Division will be at the same rate as other members of the other Divisions in the same grade, and the following additional payments will be made to those who are not resident on the spot and have, therefore, to make a special attendance at the Office for duty.

A. *For hours outside the common times of employment.* For each hour before 9h. or after 19h. (clock time).

		Old War Bonus	+	New War Bonus.
	d.	*d.*		*d.*
Principal or Staff Assistants	9	3	+	2
Staff Clerk (or corresponding salary)	6	2	+	1
Clerk Computer (or corresponding salary)	4½	1½	+	1
Probationers and Boy Clerks	3	1	+	½

B. *Night work.* For each attendance.

		Old War Bonus			New War Bonus.	
	s.	*d.*	*s.*	*d.*		*s.*	*d.*
Meteorologist in Charge	15	0	5	0	+	3	0
Principal or Staff Assistant	10	0	3	4	+	2	0
Staff Clerk (or corresponding salary)	6	8	2	3	+	1	4
Clerk Computer (or corresponding salary)	5	0	1	8	+	1	0
Probationer or Boy Clerk...	3	4	1	2	+		8

C. *For Sunday attendances not involving night work.*
The same for each attendance as for night work.
Girl Clerks as for Boy Clerks.

These payments will count as overtime payments and will be payable on the attendances recorded.

The duration of the Sunday attendances will be reduced to eight hours. The average duration of attendance should be 44 hours a week with the understanding that four hours' additional attendance may be called for on emergency as in other Divisions.

It was agreed that the scale of payments set out in the memorandum be adopted as from 1st June, 1919, and that if any question arose as to members of the Staff adversely affected, the matter should be reported again to the Committee.

War Bonus (Minute 760).—Reported—the following letter :—

17335/19.—M.O. 6830.

Treasury Chambers,
15th May, 1919.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letter of the 15th ult. (No. 05599) relative to the application to the staff of the Meteorological Office of Award No. 84 of the Conciliation and Arbitration Board for Government Employees.

In reply I am to say that My Lords concur generally in the proposals of the Meteorological Committee and they will be prepared to make such supplementary provision as may be required for the purpose, estimated at present at £6,000 per annum.

I am, however, to request that Their Lordships may be furnished with a complete salary list showing how the remuneration of the staff is divided between salary and war bonus and that any cases in which it is doubtful whether the new award should apply may be referred to Them for Their decision.

I am, &c.,
T. L. HEATH.

The Director,
Meteorological Office,
S.W. 7.

In accordance with Award No. 84 of the Conciliation and Arbitration Board for Government employees it was agreed to allow war bonus to employees of the Office Staff at the following rates in lieu of the rates authorised in Minute 732 :—

WAR BONUS.

——	Men.	Women.
Employees under 16 years of age	11*s.* 6*d* a week.	
Employees under 18 years of age but not under 16 years of age.	11*s.* 6*d.* a week + 20 per cent. of their ordinary remuneration.	
Employees under 21 years of age but not under 18 years of age.	17*s.* a week + 20 per cent. of their ordinary remuneration.	
Employees of 21 years of age and upwards :—		
(1) If their ordinary remuneration does not exceed 60*s.* a week.	24*s.* a week + 20 per cent. of their ordinary remuneration.	15*s.* a week to those on weekly wages and £40 a year to those on annual salaries + 20 per cent. of their ordinary remuneration so that the total rate shall in no case be more than £200 per annum.
(2) If their ordinary remuneration exceeds £156 10*s.* 0*d.* per annum.	£60 per annum + 20 per cent. of their ordinary remuneration, with a minimum payment of £93 12*s.* 0*d.* per annum and a maximum payment of £300 per annum.	

The Award is subject to the same conditions as the previous award and dates from 1st April, 1919.

766. OBSERVATORIES AND STATIONS. — **Valencia.** — *Wages of Handyman.* — Recommended—that the wages of **J. Sullivan**, Handyman at Valencia Observatory, be increased to 33*s.* a week, inclusive of war bonus, to date from 28th April, 1919.

Approved.

Armagh.—Submitted—correspondence between the Superintendent of Statistics and the Director of the Observatory at Armagh with reference to the installation of a tube anèmometer in which alterations to a dome of the observatory or other provision to staging the anemometer were contemplated at a cost of £400.

The consideration of the question was postponed.

Southport.—Submitted—correspondence and note of an interview with Mr. Alderman Trounson of Southport, from which it appeared that the Corporation made the continuance of suitable financial provision for the Fernley Observatory contingent upon a grant-in-aid from the Office.

It was agreed that the Office might make itself responsible for distributing, on the same lines as the official publications, the tabulations of results of the Fernley Observatory as being based upon hourly readings of continuous records of approved accuracy and of scientific importance to the recognised Meteorological Institutions of the world, and that consideration on that ground up to the sum £50 a year might be offered to Alderman Trounson in consideration of 500 copies of the results or the right to use 500 copies.

Observations from ships crossing the British seas at night.—Reported—that an effort was being made to obtain a regular service of reports from cross-channel mail steamers at 1h. with a view to their inclusion in the special report prepared for aviation purposes.

767. EDINBURGH, SCOTTISH METEOROLOGICAL SOCIETY (Minute 733).—Reported—the following statement by the Treasurer of the Scottish Meteorological Society for the year ended 31st March, 1919.

STATEMENT OF ACCOUNT OF SCOTTISH METEOROLOGICAL SOCIETY WITH THE METEOROLOGICAL COMMITTEE FOR THE YEAR ENDED 31ST MARCH, 1919.

Receipts.

	£	s.	d.	£	s.	d.
Balance carried forward				15	0	1
From the Meteorological Committee—	£	s.	d.			
Grant { Normal £350 / War Suppl. £60 }	410	0	0			
Further War Bonus ...	52	14	2			
				462	14	2
On account of Reports supplied to the Registrar-General for Scotland				100	0	0
				£577	14	3

Expenditure.

	£	s.	d.	£	s.	d.
1. Salaries :—						
Superintendent ...	300	0	0			
„ Bonus ...	21	0	10			
Assistants	170	0	0			
„ Bonus ...	31	13	4			
Occasional Assistance	20	5	0			
				542	19	2
Workmen's Compensation Insurance					11	10
National Health Insurance ...				1	9	0
2. Furniture and Fittings					—	
3. Binding Official Reports				4	4	9
4. Telephone—Rent for one Year ...				6	0	0
5. Registration of Telegraphic Address				1	1	0
6. Postages, Telegrams and Petty Outlays				5	5	4
				£561	11	1
Balance carried forward				16	3	2
				£577	14	3

WILLIAM B. WILSON,
Hon. Treasurer.

768. PUBLICATIONS.—Authority was given for the following publications :—

M.O. 220e. Geophysical Memoir No. 15. The Climate and Weather of the Falkland Islands and South Georgia, by C. E. P. Brooks.

M.O. 232h. Professional Notes No. 8. Conditions of temperature, humidity, etc., in the upper air during thunderstorms, by Captain C. K. M. Douglas.

M.O. 236. The Book of Normals of Meteorological Elements for the British Isles for period ending 1915, Section 1. Monthly Normals for Stations.

Aids to Forecasting by E. Gold, F.R.S.

769. DIRECTOR'S REPORT AND ACCOUNTS :—

A meeting of the Gassiot Committee of the Royal Society was held on Tuesday, 13th May, at which the report of the work of the Observatories, Kew, Eskdalemuir, and Valencia, and the accounts for the financial year were approved.

The meeting noted that the installation of a "variation" recorder at Eskdalemuir was desirable for a satisfactory report on magnetic variation in the mining journals.

The fourteenth series of discussions at the Office on Monday evenings postponed from the winter months on account of fuel shortage and the difficulty of travelling was begun on Monday, April 28th, and is to be continued week by week instead of in alternate weeks until June 23rd.

Arrangements are in progress, on the invitation of the Director, for a special meeting of the Royal Meteorological Society to be held at Kew Observatory, Richmond, on July 2nd, 1919.

Arrangements are also in progress for making an exhibit representing *the study of the weather during the war* at the Conversazione of the Royal Society on May 28th, 1919.

The exhibit will include a day's record of the changes in the vertical component of the earth's magnetic force as recorded by a galvanometer at Eskdalemuir, which is in connexion with a loop of wire laid along the 1,000 feet contour enclosing a neighbouring hill according to the suggestion of Dr. Crichton Mitchell.

The Office has also undertaken to provide a meteorological exhibit for the Royal Agricultural Show at Cardiff beginning on June 24th and for the exhibition of Science products to be organised for July by the British Science Guild.

Dr. Jeffreys has prepared a paper *on the variation of the coefficient of turbulence in the atmosphere and its relation to the angle between the surface wind and the isobar*, which after some modification will be offered to the Royal Society.

The observations of the range of visibility in the North Sea which were supplied by the Hydrographer as material for a report on visibility in different areas under different meteorological conditions and have been summarised in various ways by Mr. Charles Harding have been further dealt with at the Hydrographer's request, and a new form of report for one month has been submitted for his consideration.

Various interviews have been given to Mr. Zaiman, of Messrs. Boulton and Paul Ltd., with respect to meteorological conditions over the Atlantic; and to Lieut. Rendle, an Australian Officer of the R.F.C., who is anxious to make the journey to Australia by aeroplane and desires special information about the monsoon. Dr. Gilbert Walker, Director General of Indian Observatories, who has arrived in this country in connexion with the proposed International meeting in Paris and the meeting of representatives of British Meteorological Services, has very kindly undertaken to give Lieut. Rendle the benefit of his experience in relation to the period of the Indian monsoon.

STOCK OF INSTRUMENTS. (Minute 699).

The Superintendent of Instruments reports as follows:—

The instruments and stores in charge on 31st March, 1919, were inspected and certified by Mr. M. A. Giblett, Professional Assistant, on 31st March and 1st April.

A comparison of the remains thus certified with the remains on charge as shown in the store ledger reveals the following discrepancies:—

Item.	Excess of actual over ledger.	Defect from ledger.
Airmeters	1	
Boards, asbestos	1	
Cells, Leclanché	29	
Wire, electrical	—	9 yards
Bottles, small, ink	38	
Bottles, water	3	
Buckets, canvas	1	
Candles	½ lb.	
Batteries, refill, No. 12	1	
Lanterns, paper		14
Measures, rain, 8″ (inch)		1
Pens, barograph		10
Thermometers, ordinary	2	
„ for thermographs	1	
„ aeroplane		1
Valves, fine adjustment		1
Traps, water, for anemobiagraph	1	
Rods, zinc (for Leclanché cells)	2	
Cases, wood, packing	364	
Wire, soft iron		3 ozs.

The large discrepancy under "cases, wood packing," is explained partly by the fact that small "post" boxes have not hitherto been taken on ledger charge.

Director's authority for taking on charge of the excess stores and for striking off charge the stores in defect was given on 22nd April.

The estimated value of the instruments and stores on charge on 31st March is £10,534.

NOTE BY THE SUPERINTENDENT ON SURPLUS INSTRUMENTS.

The following instruments and stores now available are surplus to present or anticipated requirements :—

	Price. £ s. d.	Cost. £ s. d.
25 Airmeters	2 2 6	53 2 6
15 Anemometers, cup, electric (50 more expected shortly) ...	3 5 0	48 15 0
10 Pocket Barographs (20,000 ft.)	9 18 0	99 0 0
5 Barographs, Aviation (30,000 ft.) (Aluminium cases)	8 0 0	40 0 0
56 Barographs, medium	6 0 0	336 0 0
44 „	4 0 0	176 0 0
40 Nephoscopes, Besson	4 7 6	175 0 0
12 Assmann psychrometers by Casella	15 0 0	180 0 0
30 Aeroplane thermometers	2 1 6	62 5 0
50 Anemometers, Richard, fan for kite balloons or ventilation purposes.	6 13 0	332 10 0
10 Anemometers, Dines, pressure tube with direction recorder	—	1,000 0 0
25 Theodolites, with stands	40 0 0	1,000 0 0
Balloons pilot, sizes 48″, 65″, 72″, and 90″ circumference, prices from 6*d.* to 1*s.* 8*d.* each to value of £2,000.	—	2,000 0 0
		5,502 12 6

Steps are being taken to dispose of these instruments at the usual price, cost price + 10 per cent.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£ s. d.
Cash balance on the 25th March, 1919	2,089 5 0
Receipts from 25th March, 1919	16,542 8 9
	18,631 13 9
Cheques drawn from 25th March, 1919	12,291 18 11
Cash balance on 27th May, 1919	£6,339 14 10

Submitted—The following Statement of Accounts for the twelve months ended 31st March, 1919, prepared for audit by the Comptroller and Auditor-General :—

RECEIPTS.								PAYMENTS.					
1917-18. £ s. d.		£ s. d.		1918-19. £ s. d.		1917-18. £ s. d.		£ s. d.		1918-19. £ s. d.	
2,047 13 5	Balance from year 1917-18	—		99 14 10		1,000 0 0	Adviser...	—		1,000 0 0	
22,500 0 0	Parliamentary vote	22,500 0 0				—	Acting Director— Col. H. G. Lyons ...	—		147 16 3	
—	Vote of Credit (Treas. 43850/17)	7,250 0 0									
				29,750 0 0			OFFICE SALARIES (including Insurance) :				
	DEPARTMENTAL EXPENSES REPAID :					11,568 19 3	Monthly	15,015 5 6			
1 17 6	Forecasts, &c. ...	42 11 11				2,296 10 0	Weekly	3,285 7 6			
	Marine, Statistical, and Administrative	99 6 0								18 300 13 0	
75 12 9							EXPENSES OF OFFICE :				
451 4 8	Instruments ...	1,624 7 7				693 2 0	Rent, Heating, and Lighting	702 16 10			
				1,766 5 6		41 17 9	Furniture and Equipment	44 7 9			
	INCIDENTAL EXPENSES REPAID :					22 11 10	Library	14 10 4			
335 15 4	D.W. Report ...	486 12 7					Insurances and Repairs				
93 3 1	Divisional ...	256 9 8				72 0 11		57 5 6			
12 0 5	Advertising Account	22 13 2					Incidental Expenses and Consumable Stores				
				765 15 5		205 5 3		480 12 9			
96 0 8	STATIONERY OFFICE	—		145 17 4		7 10 0	Advertising Account	7 10 0		1,307 3 2	
	TELEGRAPH CHARGES REPAID	—		134 3 0		927 15 1	POST OFFICE : Postage	1,349 12 4			
2,010 4 4						165 5 8	Telephones	265 4 7			
	TELEPHONE CHARGES REPAID	—		117 4 0		3,839 5 2	Telegrams	3,277 4 0			
1 14 11										4,892 0 11	
114 9 6	INSPECTIONS ...	—		57 12 1		64 1 4	STATIONERY OFFICE...	—		96 0 8	
	INSTRUMENTS :					141 1 8	TRAVELLING EXPENSES	—		234 0 11	
2,958 0 3	Royal Navy ...	608 11 4									
7,130 10 2	By Sales from Stock	30,064 3 7					SUPERANNUATION :				
				30,672 14 11		25 0 0	Pensions not chargeable on Fund ...	25 0 0			
	SUPERANNUATION ACCOUNT :						Pensions chargeable on Fund				
562 10 0	Annuities... ...	540 0 0				243 19 4		132 2 0			
	Interest on Investments	50 2 8				562 10 0	Annuities	532 10 0			
46 5 9				590 2 8		—	Contribution to Fund	—			
										689 12 0	
	*OBSERVATORIES, BRANCHES, AND STATIONS :						COST OF INSTRUMENTS :				
638 19 2	Richmond ...	456 7 7				2,959 17 11	Royal Navy	1,776 9 4			
1,017 13 9	Eskdalemuir ...	1,023 12 1				9,211 3 0	For Stock	26,422 18 1			
30 3 2	Cahirciveen ...	27 11 5								28,199 7 5	
326 4 0	Farnborough ...	27 2 11					*OBSERVATORIES, BRANCHES, AND STATIONS :				
15 12 7	Falmouth... ...	11 4 0				2,208 16 1	Richmond	2,540 3 8			
6 6	Benson	—				1,631 3 6	Eskdalemuir ...	2,086 3 11			
—	Edinburgh ...	—				747 7 7	Cahirciveen... ...	1,068 2 1			
	Investigation of Atmospheric					618 15 1	Farnborough ...	776 2 8			
						327 9 5	Falmouth	617 1 9			
500 0 0	Pollution ...	476 4 9				531 18 8	Benson	547 13 6			
118 7 8	Miscellaneous ...	192 19 6				364 12 3	Edinburgh	478 1 5			
				2,215 2 3			Investigation of Atmospheric Pollution				
13 0 0	National War Bonds	—		3 0 0		291 4 9		340 11 0			
	Fire Insurance					1,331 19 10	Miscellaneous ...	1,720 9 7			
2 12 6	Claim	—		—						10,174 9 7	
	King George's						Balance due to Bank				
4 0 0	Fund	—		—		—	on April 1st, 1918 ...	—		1,221 12 1	
—	Salaries refunded...	—		4 13 8		4 0 0	King George's Fund...	—		—	
41,104 2 1	*Less* War Loan										
97 16 0	Subscription ...	—		—		—	BALANCE :				
							Cash at Bank ...	—		—	
41,006 6 1						99 14 10	,, at Office ...	—		108 10 0	
1,221 12 1	BALANCE DUE TO BANK	—		49 0 4							
£42,227 18 2				£66,371 6 0		£42,227 18 2				£66,371 6 0	

* For details, see separate statement.

Statement of Assets and Liabilities at 31st March, 1919.

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.		£ s. d.		£ s. d.	
6,868 12 0	To sundry creditors	10,894 0 3		99 14 10	By cash at Office	108 10 0	
476 8 6	,, Superannuation	1,476 8 6		36 8 2	,, salaries reserved (premiums) ...	36 8 2	
1,221 12 1	,, balance due to Bank ...	49 0 4		3,295 6 8	,, M.O. instruments in stock ...	10,534 2 11	
				3,316 17 10	,, sundry debtors	3,191 17 2	
578 19 11	,, balance	2,463 9 10		2,397 5 0	,, Admiralty	1,012 0 8	
£9,145 12 6		£14,882 18 11		£9,145 12 6		£14,882 18 11	

NOTE.—On 31st March the amount of Government securities held for the provision of Superannuation Annuities was £26 14*s.* 2*d.* 2½ per cent. Consols and £989 9*s.* 6*d.* 5 per cent. War Loan.

Observatories.—Statement of Accounts for the twelve months ended 31st March, 1919.

Richmond.

1917-18.	Receipts.		1918-19.
£ s. d.		£ s. d.	£ s. d.
82 0 0	Subvention, Scott Antarctic Fund	—	
405 2 4	Gassiot Trust	338 12 9	
			338 12 9
121 9 5	Expenses refunded locally ...		96 16 7
3 3 7	Tests and Commissions		7 14 6
27 3 10	Cost of books and forms refunded		13 3 9
1,569 16 11	Balance		2,083 16 1
£2,208 16 1			£2,540 3 8

1917-18.	Payments.		1918-19.
£ s. d.		£ s. d.	£ s. d.
1,788 2 10	Salaries, Scheduled...	2,131 6 11	
42 18 8	Sunday and holiday duty	34 2 0	
			2,165 8 11
27 2 9	Cost of forms, &c....		81 9 7
44 1 1	Rent, Rates, Taxes, Repairs and Insurance		48 3 11
99 15 9	Fuel and lighting		101 11 8
42 10 4	Equipment and instruments ...		11 2 9
109 1 11	Consumable stores		60 19 3
19 4 3	Incidental expenses		21 18 6
4 17 0	Books, &c.		7 4 0
31 1 6	Postage, telephones and telegrams		37 5 9
—	Travelling expenses		4 19 4
£2,208 16 1			£2,540 3 8

Eskdalemuir.

£ s. d.		£ s. d.	£ s. d.
1,000 0 0	Subvention, Royal Society ...	1,000 0 0	
17 13 9	Expenses refunded locally ...	23 12 1	
613 9 9	Balance	1,062 11 10	
£1,631 3 6			£2,086 3 11

£ s. d.		£ s. d.
1,177 9 7	Salaries, Scheduled ...	1,503 9 1
65 10 7	Cost of forms, &c	56 18 11
13 0 7	Rent, Rates, Taxes, Repairs and Insurance	25 9 5
194 12 9	Fuel and lighting	266 17 4
31 8 3	Equipment and instruments ...	14 0 8
21 3 11	Consumable stores...	23 5 3
6 13 7	Incidental expenses	15 10 2
4 11 2	Books, &c.	18 18 3
40 0 9	Postage, telephones and telegrams	40 9 6
76 12 4	Travelling and motor car expenses	121 5 4
£1,631 3 6		£2,086 3 11

Cahirciveen.

£ s. d.		£ s. d.	£ s. d.
5 13 2	Subventions (Rosse Fund) ...	4 10 0	
24 10 0	Expenses refunded locally ...	23 1 5	
717 4 5	Balance	1,040 10 8	
£747 7 7			£1,068 2 1

£ s. d.		£ s. d.
587 15 5	Salaries, Scheduled	909 14 10
2 9 7	Cost of forms	2 10 5
62 19 11	Rent, Rates, Taxes, Repairs and Insurance	56 1 4
27 3 5	Fuel and lighting	30 14 7
15 6 11	Equipment and instruments ...	7 18 9
25 5 1	Consumable stores	8 16 7
4 18 8	Incidental expenses	17 18 3
1 8 0	Books, &c.	13 2 8
19 13 7	Postage, telephones and telegrams	20 17 2
7 0	Travelling expenses	7 6
£747 7 7		£1,068 2 1

Farnborough.

£ s. d.		£ s. d.	£ s. d.
250 0 0	Subvention (Advisory Committee for Aeronautics)	—	
76 4 0	Expenses refunded (War Office) ...	27 2 11	
292 11 1	Balance	748 19 9	
£618 15 1			£776 2 8

£ s. d.		£ s. d.
347 15 6	Salaries, Scheduled	646 7 6
3 0	Cost of Forms	—
49 16 4	Rent, Rates, Taxes, Repairs and Insurance	6 4
—	Fuel and lighting	—
66 3 11	Equipment and instruments ...	45 0 2
73 7 3	Consumable stores	11 7
5 9 1	Incidental expenses	20 17 11
1 11 6	Books, &c.	4 7 6
54 9 10	Postage, telephones and telegrams	53 1 0
19 18 8	Travelling and motor car expenses	5 10 8
£618 15 1		£776 2 8

Falmouth.

£ s. d.		£ s. d.	£ s. d.
15 12 7	Expenses refunded locally ...	11 4 0	
311 16 10	Balance	605 17 9	
£327 9 5			£617 1 9

£ s. d.		£ s. d.
30 0 0	R. Cornwall Polytechnic Society...	30 0 0
204 19 0	Salaries, Scheduled	462 10 4
—	,, Additional	—
30 2 10	Rent, Rates, Taxes, Repairs and Insurance	47 12 8
—	Fuel and Lighting	2 0
3 6	Equipment and instruments ...	2 6
—	Consumable stores	1 4 9
3 13 6	Incidental expenses	1 2 1
—	Books, &c.	17 6
58 7 7	Postage, telephones and telegrams	71 8 0
3 0	Travelling expenses	2 1 11
£327 9 5		£617 1 9

BENSON.

1917–18. £ s. d.	Receipts.	1918–19. £ s. d.	1917–18. £ s. d.	Payments.	1918–19. £ s. d.
6 6	Expenses refunded locally ...	—	450 10 1	Salaries, Scheduled...	482 16 8
551 12 2	Balance	547 13 6	1 13 6	Overtime, &c.	—
			—	Cost of forms, &c.	—
			1 0 0	Rent, Rates, Taxes, Repairs and Insurance	—
			3 5 0	Fuel and lighting	10 0
			9 0 2	Equipment and instruments ...	4 8 4
			60 11 9	Consumable stores	39 5 0
			2 14 5	Incidental expenses	1 9 0
			10 6	Books, &c.	17 6
			22 13 3	Postage, telephones and telegrams	17 0 1
			—	Travelling expenses	1 6 11
£551 18 8		£547 13 6	£551 18 8		£547 13 6

METEOROLOGICAL OFFICE, EDINBURGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
364 12 3	Balance	478 1 5	350 0 0	Subvention	462 14 2
			14 12 3	Travelling expenses	15 7 3
£364 12 3		£478 1 5	£364 12 3		£478 1 5

ADV. COM. ATMOS. POLLUTION.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Balance from 1917–18	208 15 3	135 11 4	Salaries scheduled	135 6 8
500 0 0	Subvention	476 4 9	15 6 8	Overtime, Clerical assistance, &c.	30 0 3
			12 17 11	Equipment and instruments ...	—
			7 13 6	Consumable stores	—
			116 12 9	Incidental expenses (including printing of report for 1916–17)	173 10 7
			1 13 3	Books, &c.	3 13 6
			1 9 4	Postage, telephones and telegrams	—
			208 15 3	Balance	344 9 0
£500 0 0		£685 0 0	£500 0 0		£685 0 0

MISCELLANEOUS STATIONS.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
118 7 8	Cost of forms refunded	179 14 6	344 10 0	Subventions : Aberdeen, Armagh ...	344 10 0	
—	Expenses refunded locally ...	6 15 0	55 0 0	British Rainfall Organisation	55 0 0	
—	Tests and Commissions	6 10 0				399 10 0
1,213 12 2	Balance	1,527 10 1	778 19 8	Salaries of Observers (44)		960 15 10
			—	Overtime		—
			108 9 0	Cost of forms, &c.		297 10 3
			3 4 5	Rent, Rates, Taxes, Repairs and Insurance		8 16 5
			1 0 9	Fuel and lighting		—
			3 12 8	Equipment and instruments ...		4 2 6
			—	Consumable stores		—
			16 13 5	Agents' fees, &c.		23 3 3
			4 17 11	Books, &c.		17 6
			15 12 0	Postage, telephones and telegrams		25 13 10
£1,331 19 10		£1,720 9 7	£1,331 19 10			£1,720 9 7

METEOROLOGICAL FIELD SERVICE.

FRANCE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
1,800 0 4	War Office	5,015 9 1	67 9 2	Salaries : Lt.-Col. E. Gold...	35 18 8	
857 12 0	Balance	—	—	Capt. A. H. R. Goldie ...	—	
			—	Lieut. E. H. Chapman ...	—	
			—	Lieut. C. D. Stewart ...	—	
			32 11 4	Sergt. R. Pyser	27 15 11	
			33 16 0	Sergt. E. L. Clinch ...	21 0 0	
			71 10 10	Corpl. A. G. Goad ...	66 1 0	
			34 0 8	Corpl. C. F. J. Jestico ...	21 0 0	
			25 10 3	Sergt. R. M. Poulter ...	9 19 0	
			264 18 3		181 14 7	
			2 11 0	Less Salaries refunded	22 19 11	
			262 7 3			158 14 8
				Incidental Expenses :		
			30 5 10	Postage	17 10 11	
			—	Telegrams	—	
			4 11 0	Printed books ...	—	
			0 7 5	Miscellaneous... ...	—	
						17 10 11
			2,360 0 10	Instruments...		4247 10 7
			—	Balance		591 12 11
£2,657 12 4		£5,015 9 1	£2,657 12 4			£5,015 9 1

DARDANELLES.

1917–18.				1918–19.	1917–18.			1918–19.
Receipts.					*Payments.*			
£ s. d.				£ s. d.	£ s. d.		£ s. d.	£ s. d.
357 16 2	Admiralty			—	32 6 0	Corpl. C. V. Ockenden	—	17 4 0
2,128 15 3	War Office			622 17 6		Incidental Expenses:		
—	Balance			1,040 16 9	15 7 9	Postage	4 14 0	
					1,438 9 10	Telegrams	1,062 10 6	
					—	Printed books ...	—	
					—	Miscellaneous ...	—	
								1,067 4 6
					525 10 2	Instruments		579 5 9
					471 17 8	Balance		—
£2,486 11 5				£1,663 14 3	£2,486 11 5			£1,663 14 3

HOME.

£ s. d.				£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	War Office			1,026 15 9	—	Salaries:		
—	Balance			90 18 5	—	Pioneer C. E. Goad ...	0 6 9	
					—	,, W. R. Penfold	—	
					—	Sapper W. J. Fowler...	11 13 6	
					—	Pioneer A. H. Lupton	—	12 0 3
					—	Instruments		1,105 13 11
£ —				£1,117 14 2	£ —			£1,117 14 2

NINETY-FIFTH MEETING.

South Kensington, S.W. 7, 25th June, 1919.

PRESENT:

THE DIRECTOR, IN THE CHAIR.

CAPTAIN HARVEY. | COLONEL LYONS.

770. The Minutes 761–769 of the Meeting of 28th May, 1919, previously circulated in proof, were taken as read and confirmed.

771. CORRESPONDENCE.—**Admiralty.**—*Preparation of Ice Charts for the Northern Hemisphere.*—Reported—(M.O. 7501) from the Hydrographer asking for the revision of the ice charts of the Southern Hemisphere and also if it would be possible to produce charts of a similar character for the Northern Hemisphere.

The Director submitted a map giving some of the requisite information, and also some maps prepared by the Marine Division, from data available in the Office. A memorandum (M.O. 9583) by Mr. H. Harries was also reported.

It was agreed that the Hydrographer should be consulted as to the most suitable manner of publishing the information.

War Office.—*Disposal of meteorological observations made by the Meteorological Section R.E.*—Submitted—(M.O. 7408) from the Commandant of the Army Meteorological Services stating that by 121/9647 (A.G. 7b) the War Office had approved that all meteorological observations made by the Meteorological Section R.E. in Salonika, Italy, France, &c., should be handed over to the Meteorological Office for study and disposal.

It was reported that much of the material had already arrived and that arrangements were being made for Mr. Pyser, recently demobilised from the Meteorological Section R.E. to sort and index the information.

Foreign Office.—*Co-operation with Amundsen's expedition for geophysical investigations.*—Reported—the receipt of the following letter from the Foreign Office :—

(71,510.)—M.O. 8,063.
2 enclosures.

The Norwegian Minister presents his compliments to the Secretary of State for Foreign Affairs, and, by order of his Government, has the honour to apply for Earl Curzon of Kedleston's kind assistance in the following matter :—

By a Bill of the 21st March this year it was proposed to the Norwegian Storting that the necessary means should be granted to establish and run geophysical stations which should be worked in co-operation with Roald Amundsen's expedition to the North Pole.

It is also suggested in the Bill that the Norwegian Government should approach the Governments of Great Britain, Canada, Finland, Sweden, Denmark, Iceland, United States of America, Japan and Siberia with a view of learning whether these countries would be willing to take part in this work.

Monsieur Vogt begs leave to enclose two copies of "Geophysical Investigations in the Arctic Regions in Co-operation with Roald Amundsen's Expedition," and would feel much obliged for being informed whether the Government of the United Kingdom and of Canada would be willing to establish such co-operation, which would no doubt be of very great importance.

Norwegian Legation,
London,
May 9th, 1919.

GEOPHYSICAL INVESTIGATIONS IN THE ARCTIC REGIONS IN CO-OPERATION WITH ROALD AMUNDSEN'S EXPEDITION.

As Roald Amundsen had decided to start his Arctic voyage in the year 1914, the International Aerological Polar Commission held a meeting in Copenhagen, February, 28th–March 1st, 1914, at which was planned an international co-operation with the expedition.* They decided to promote the erection of a network of aerological stations round about the Arctic Ocean, where, as far as possible, meteorological and aerological observations should be made as long as the expedition lasted. In the meantime the war broke out, international co-operation was impossible, and the expedition was postponed.

In spite of the war, Roald Amundsen managed to start his expedition in June, 1918. He took with him a large and first-class meteorological, aerological and oceanographical outfit and instruments for measurements of the terrestrial magnetism and investigations of the northern lights. In addition, he succeeded in engaging the meteorologist Dr. H. U. Sverdrup as leader of the scientific work of the expedition. The latter has therefore the best conditions to be able to make valuable geophysical investigations in the Arctic regions. However, these investigations have much less value when they are performed isolated than when geophysical observations are also made at stations round about the Arctic Ocean. It would therefore be most valuable if as many geophysical stations as possible could be erected to co-operate with the expedition.

For the work of these stations there has been, in close agreement with the determinations in Copenhagen, made out the following plan :—

1. As long as Roald Amundsen's expedition lasts, aerological observations are, as far as possible, to be made. This will be of greatest importance in the principal year 1920, when Amundsen will be nearest to the North Pole. Later on there shall in any case, even at stations of limited material, be taken observations on the days given in the following table :—

Table of Fixed Days.

——	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1919 ...	2	5–7	6	3	8	4–6	3	4–9	4	8–10	6	4
1920 ...	7–9	5	4	8	5–7	10	5–10	5	8–10	7	4	2
1921 ...	6	3	3	6–8	12	6–11	7	2–5	8	6	3	7–9
1922 ...	5	2	8–10	6	8–13	8	5–7	3	7	5	1–3	7
1923 ...	4	7–9	8	2–7	3	6–8	5	2	6	3–5	8	6
1924 ...	2–4	7	3–8	3	7–9	5	3	7	3–5	2	6	4

By arrangement with Dr. Sverdrup, the expedition will on these days make ascents with registering balloons, kites, captive balloons, or pilot balloons.

2. The following programme for observations must be considered necessary :—

a. Meteorological observations as they are performed at a first order station.
b. Pilot balloon ascents which, at least in the year 1920, are to be performed daily.
c. Observations made as frequently as possible on the direction and velocity of the motion of clouds.
d. Kite ascents, ascents of captive balloons and, as far as possible, registering balloons at the stations intended for the purpose.

* Procès-verbaux des seances de la Commission Internationale Polaire d'aérostation scientifique. Réunion de Copenhague, 28 février–1 mars, 1914. St-Pétersbourg, 1914.

3. The stations are to perform observations at three fixed hours daily (at local time) On the fixed days given at the above table there shall be performed at 7 a.m. (Greenwich time) direct observations of all meteorological elements, and at the same time the aerological ascents are to take place.

4. As the expedition is taking with it registering apparatus for terrestrial magnetism, it will be of great importance that the stations are, as far as possible, also equipped with such.

5. The Stations are if possible to be equipped with apparatus for the photographing of the northern lights.[1] It is especially required to get photographs on the above-mentioned fixed days. The best thing would be to perform photography of the northern lights at the same time at two stations connected by telephone, for the determination of the height and position of the northern lights, the stations being at a distance of about 25 k. from each other. If no bases can be obtained, the northern lights should be photographed from one station. It may then be limited by only photographing coronas and quiet, regular arcs and bands for the determination of their accurate position among the stars. It is especially of importance to get photographs of the highest point of the arc and the terminal points on the horizon in speedy succession in order to get variations with the time.

The usual observations of the northern lights are also required, particularly the hour for the appearance of special forms, *e.g.*, corruscation, corona and drapery formations. These observations should also be made at the stations which are not equipped with apparatus for the photography of northern lights. Further, the following may be emphasised :

6. It is essential that possible Arctic expeditions, *e.g.*, Aeroplane expeditions, should be equipped with instruments so that they can, in a scientific respect, co-operate with Roald Amundsen's Arctic expedition. It is particularly of importance to perform aerological observations on the fixed days given in the above table.

7. The observations should be published as soon as possible. A collected scientific treatment of the material will be carried out by Dr. Sverdrup.

8. Owing to the limited time it is to be foreseen that it may be impossible to establish all the stations in the year 1919. Stations which are established in the summer 1920 will also be of exceedingly great importance.

As the matter is of great importance it is hoped that the Norwegian Government will grant the necessary funds to establish kite and registering balloon stations at Spitsbergen, Tromso, Kristiania and Bergen. In the north of Russia it is likely that there will be established two or three pilot balloon stations at the "Central Hydrometeorological Station" at Archangel. It is hoped that the countries to which the Norwegian Government will send a request to take part in the matter will do this as far as in their power. We have here an exceedingly good opportunity of extending our knowledge and understanding of the geophysical conditions of the Arctic regions.

Communication concerning the erection of stations and their working programme should be sent to the Norwegian Meteorological Institution, Kristiania.

[1] Concerning the photographing of northern lights, refer to the following papers by C. Stormer :
Sur les trajectoires des corpuscules électrisés dans l'espace. 21.
Archives des sciences physiques et naturelles, Genève, 1911.
Terrestrial magnetism, 1913, 1915, and 1916.
Astrophysical Journal, Nov., 1913, and April, 1916.
Comptes Rendus, Paris, 16 June, 1913, and 13 March, 1916.
Bulletin de la Soc. Astr. de France, Nov. 1913.

Kristiania,
February, 1919.

With regard to paragraph 5, it was agreed that the Gassiot Committee should be consulted as to the advisability of making arrangements for photographing the "Northern Lights" in Shetland.

Det Norske Meteorologiske Institut.—*Co-operation with Amundsen's expedition for upper air observations.*—Reported —the receipt of a similar letter (M.O. 7380) from the Director of the Norwegian Meteorological Institute stating that in connection with Roald Amundsen's North Polar expedition arrangements had been made for making ascents with registering balloons, kites, &c., on certain fixed days between 1919 and 1924, and asking for the co-operation of the British aerological stations. A copy of the letter had been circulated to the observatories with a view to their making upper air observations on the days fixed.

Dr. F. Lindholm.—*Application for facilities for the study of aerology.*—Reported—the following letter (previously circulated to members of the Committee) :—

Stockholm,
30th May, 1919.

Monsieur le Directeur,

Par la présente j'ai l'honneur de m'addresser à vous, Monsieur le Directeur, en demandant s'il me sera permis de passer un ou deux mois de cet été en Angleterre pour des études météorologiques. C'est que je me suis vivement intéressé pour les recherches aérologiques et puisqu'il m'est à présent possible de faire un voyage d'étude, mes pensées sont en premier lieu allées à Angleterre, où ces recherches depuis bien des années ont été poursuivis avec autant de progrès pour la science météorologique. En Suède nous n'avons pas encore commencé des observations régulières sur ce domaine, mais à cause de l'importance qu'elles preuvent pour la pratique avec le développement de l'aviation

l'intérêt y est en augmentant. Aussi votre institut a son attention tirée à ces études et se prépare à y participer. Pour me faire prendre part à des recherches analogues en étranger, j'ai reçu une subvention de notre Gouvernement.

Si vous permettez, j'aimerais pouvoir assister dans un Observatoire Aérologique, peut-être à celui de Benson near Wallingford. Les instruments enregistreurs du Directeur de l'Observatoire, Monsieur W. H. Dines, me sont au principe bien connus. J'aimerais bien avoir des expériences de ceux-ci. Si j'avais l'occasion de prendre part aux ouvrages journaliers d'un tel Observatoire, et s'il sera possible de commencer une étude dans ce domaine que je pourrais continuer ici en Suède avec nos moyens très restreints, je resterez à votre sincère reconnaissance. Ma vacance d'été commence déjà le 15 juin et j'avais l'intention de partir à ce temps. En demandant mes excuses que j'écris en français au lieu en anglais, dont je n'ai pas si grands exercices, je vous prie, Monsieur le Directeur, d'agréer l'assurance de ma considération la plus respectueuse.

(Dr.) F. LINDHOLM,
Premier Météorologiste.

Reported also—the receipt of a letter (M.O. 8368) from the Foreign Office stating that there was no objection on the part of that Office to the necessary facilities being granted, but suggesting that the Home Office and the Director of Military Intelligence should be consulted on the matter.

It was agreed that in the event of favourable replies being received from those departments, such facilities as might be possible should be granted to Dr. Lindholm, either at Benson or elsewhere.

772. ARRANGEMENTS WITH THE AIR MINISTRY (Minute 762).—Read—the following letter from the Treasury to the Air Ministry communicated by the Treasury :—

23902/19.—M.O. 08444.

SIR, 23rd June, 1919.

WITH reference to the recent decision of the Home Affairs Committee of the Cabinet respecting the transfer to the Air Ministry of the Meteorological Office, I am directed by the Lords Commissioners of His Majesty's Treasury to transmit the accompanying copy of a letter dated 29th ultimo which has been received from the Meteorological Committee.

My Lords understand the intention of the Home Affairs Committee to be that the scheme of organisation and co-ordination of Meteorological services recommended by the Research Committee should be adopted, just as though the original intention to transfer the Office to the Department of Scientific and Industrial Research had held good, but that the Office should be transferred to the Air Ministry instead of the Department.

It would appear to follow that the Office should be transferred as a "going concern" with a non-surrenderable grant in aid as at present under the Vote for Scientific Investigation (Civil Services, Class IV., Vote 8, Sub-head B) and self-contained as to finance, secretariat and registry services. For the time being they apprehend that no other solution is practicable in order not to break the continuity of work of the Office. The Air Council and Meteorological Committee will no doubt consult together as to the practical steps to be taken in order to develop the work of the Office to meet Air requirements, as well as those of other departments, and to combine the Meteorological staff of the Air Ministry with that of the Meteorological Office.

My Lords are not sure what is intended by the decision that the Meteorological Office should be adequately represented with the other departments. If it is transferred *en bloc*, it will cease to have a separate existence. They would suggest that it should be considered whether the Royal Society should not be invited, as in the past, to nominate representatives upon the new Meteorological Committee : a break between the connection of the Committee and the premier Scientific Society of the country would, in their view, be much to be deprecated.

The Air Council will no doubt take up with the First Commissioner of Works the question of the future accommodation of the Office.

I am, &c.,
T. L. HEATH.

The Secretary,
Air Ministry.

The Director reported that after an interview on May 29th he had accepted an invitation from General Sykes, Controller General of Civil Aviation in the Air Ministry, to attend at the Ministry on June 4th for a conference on the transfer of the Meteorological Office to the Air Ministry. At the Conference General Sykes and Mr. Nutt were present. A Memorandum was put forward suggesting in its first two paragraphs that the Meteorological Service should be constituted as a Branch of the Department of Civil Aviation under a Controller responsible to the Controller General and inviting the Director to become Controller. Thereafter the Memorandum suggested a Meteorological Council, to consist of a number of officials of the Air Ministry, with representatives of the other departments interested in meteorology, and various details of organisation in respect to the relation to other departments of the Ministry. He had explained that he was not in a position to take any action on the general questions raised, as he was still responsible to the Treasury under the Minute of 20th May, 1905, and its subsequent renewals.

Subsequently Lieutenant-Colonel Summers, D.S.O., lent by the Ministry of Labour for the purposes of organisation, with a view to arranging for the necessary personnel, had called and had invited the Director to put before a "Meteorological Co-ordination Committee" appointed by the Ministry, consisting of Sir Napier Shaw, Mr. Nutt, Finance, C. O. C. (Col. Blandy), Mr. Needham with Col. Summers, a statement of the requirements of the combined Meteorological Service of the

Air Ministry and Meteorological Office for the satisfaction of the requirements of the public departments and the general public. He had attended at the Air Ministry on Monday, June 16th, to ascertain the provision already made for the supply of daily observations by telegraph, and on June 23rd to put forward a statement of staff required to meet *inter alia* requirements as there specified. The total staff for office, observatories and distributing stations (including Edinburgh, Dublin, six seaports for ordinary meteorological work and a number of stations in the Mediterranean for the Air Service) worked out at 207 for direction, superintendence and professional staff, and 557 technical and clerical staff.

The particulars were now under consideration and a copy would be circulated to members of the Committee.

The Director also reported that he had learned from Col. Summers that upon the receipt of the Treasury letter printed above the Air Ministry was prepared to form a Joint Committee with the Meteorological Committee to consider the terms upon which the Meteorological Service should be attached to the Air Ministry. He desired especially that the Treasury representative should be on the Committee.

The Committee agreed to nominate (in addition to the Director) Mr. Barstow, the Hydrographer and Colonel Lyons to represent the Meteorological Committee.

773. British Rainfall Organization—(Minute 763) —Reported—the following letter :—

12685/19.—M.O. 07719

Treasury Chambers,

5th June, 1919.

Sir,

I have laid before the Lords Commissioners of His Majesty's Treasury your letter of the 20th March last (04070) proposing that the British Rainfall Organization should be transferred to the Meteorological Office, and in reply I am to convey to you their general authority for the transfer of the Organization on the lines set forth in your letter.

In particular they sanction—

(i.) The payment to the trustees of such sum as would be necessary to purchase an annuity of £500 per annum on the life of Dr. H. R. Mill, calculated on the tables for Post Office Annuities ;

(ii.) The payment of the costs of the transfer ;

(iii.) The charging to the grant-in-aid of the Meteorological Office of the cost of maintenance of the work of the Organization after transfer.

They will be prepared to present a supplementary estimate to Parliament in due course for the provision of the necessary funds.

Meanwhile they are in consultation with their solicitor as to the revision of the terms of the draft agreement forwarded, and as to the method of payment of the sums involved.

I am, &c.,
T. L. Heath.

The Director,
Meteorological Office.

Reported also—a letter from Mr. Carle Salter saying that Dr. Mill had received a communication from Mr. Druce intimating that the date of the proposed transfer was to be fixed for approximately 24th July, 1919.

The Director reported that in a personal interview with Mr. Salter on June 24th as to the process of transfer of the work of the Organization and other details, the following points had been raised which required the Committee's consideration :—

Staff.—Recommended—that Mr. Carle Salter be appointed a Superintendent, and that he be authorised to enter into negotiation with Mr. J. Glasspoole for appointment as Junior Professional Assistant on the Office Staff at a salary of £200 and normal war bonus, for work in connection with the Organization.

Approved.

British Rainfall.—Annual volume.—Reported—that the preparation of "British Rainfall" for 1918 was nearly complete, and that it was advisable that Dr. Mill and Mr. Salter should be responsible for the publication for that year.

Approved.

Meteorological Magazine.—Recommended—that as the current year of the Meteorological Magazine ended with January, 1920, the magazine should be carried on as at present until that date.

Approved.

It was agreed that the consideration of further details should be taken up when the general lines of the co-ordination of the meteorological services had been arranged.

774. OFFICE STAFF.—**Obituary.—Mr. T. E. Allen.**—Reported—that Mr. T. E. Allen, formerly in charge of the "Examination Branch" of the Office, died at Brockley on Wednesday, 28th May, in his 68th year. He joined the Office Staff in 1871, having been previously employed on Mr. Glaisher's staff at the Royal Observatory. He retired through ill-health in 1908.

Mr. Allen compiled the data received from the observatories in the official publication on the "Diurnal Range of Rain at the Seven Observatories in connexion with the Meteorological Office, 1871–1890."

Superannuation (Minute 732).—Reported—that under Minute 591 the eight members of the staff who were superannuated, and who had been retained on the staff during the war, were due to retire six months after the declaration of peace.

It was agreed that the question of the maximum pension needed reconsideration, and that the Treasury should be consulted as to the advisability of the adoption of one of the Civil Service scales.

Special payment to the Forecast Division (Minute 765).—It was reported that no provision had been made for extra payment of professional assistants who were not meteorologists in charge for attendance on Sundays.

It was agreed that in such cases payment should be at the rate of 12*s.* 6*d.* + 4*s.* 2*d.* (old war bonus) + 2*s.* 6*d.* (new war bonus) for each attendance.

M. T. Spence (Minute 765).—Read—a letter (M.O. 8014) from Mr. Spence stating that for various reasons he had decided not to serve as meteorologist on Airship R. 34. It was reported that Mr. Spence had communicated his decision to the Air Ministry, and resumed work at the Office on 4th June, 1919.

E. G. Bilham and **R. A. Watson Watt.**—Reported—a letter (M.O. 7344) from the Commandant of the Army Meteorological Service stating that the War Office did not approve of the suggestion that temporary commissions should be granted to Messrs. E. G. Bilham and R. A. Watson Watt.

Demobilisation.—Capt. D. Brunt (Minute 754).—Reported—that Capt. D. Brunt rejoined the staff of the Office on demobilisation as Assistant Superintendent in charge of the work on Artillery Ranges at Shoeburyness, to date from 13th June, 1919; his rate of pay being that set out in Minute 754. (Order 844.)

Resignations.—Miss M. Anderson (Minute 686) and **Miss M. Ure** (Minute 709).—Reported—that the resignation of Miss M. Anderson and Miss M. Ure, temporary girl clerks at Eskdalemuir, had been accepted as from 31st July.

Orders for Confirmation.—Reported—the following Director's orders for confirmation :—

Order 840 increasing the salaries of **H. D. K. Millar** (Minute 754), **P. R. Zealley**, and **P. W. Dingle** (Minute 765) to £90 per annum, with normal war bonus, on their reporting for duty at Shoeburyness. The salaries of Mr. Zealley and Mr. Dingle to be further increased by £7 10*s.* per annum at the end of the year in consideration of their age, provided a satisfactory report as to their efficiency be received.

Order 842 granting an extra 12 days' leave in addition to the usual allowance of the Office Staff to the staff on duty at Shoeburyness in lieu of payments for overtime and consideration for attendance at irregular hours.

Approved.

New Appointments.—P. de Rome.—Recommended—that Paul de Rome, B.Sc., be appointed Junior Professional Assistant at a salary of £180 per annum, rising to £200, and then (or earlier if qualified as forecaster) by promotion to be Senior Professional Assistant at £225 per annum, rising to £330, with the normal war bonus. The appointment to date from 1st August, 1919.

Approved.

B. C. Lewis.—Reported—that Mr. Lewis had completed his period of probation at Benson Observatory, and that a satisfactory report of his general efficiency had been received from the Superintendent.

It was agreed that Mr. Lewis should be given an appointment on the Office Staff, with he salary and grade appropriate to his age.

Miss I. H. Graham-Yooll and **Miss M. N. Wilson.**—Recommended—that Miss I. H. Graham-Yooll and Miss M. N. Wilson be appointed temporary clerks at Eskdalemuir Observatory for three months on probation from 1st August, 1919, and subsequently until 31st July, 1920. The salary to be 23*s.* a week, with normal war bonus and free quarters, or in lieu thereof 5*s.* a week lodging allowance.

Approved.

Applications for increase in salary.—H. Fahmy (Minute 715).—Reported—the receipt of a letter (M.O. 7721) from Mr. H. Fahmy, at present temporary clerk in the Statistical Division, making application for an appointment on the Office Staff as Senior Professional Assistant.

It was agreed that the matter should be reported at a later date.

C. D. Stewart (Minute 716).—Reported—a letter from Mr. C. D. Stewart, Senior Professional Assistant at Kew Observatory, stating that both with regard to salary and seniority his position on the Office Staff was inferior to that of several Professional Assistants appointed at a later date, and asking that his position might be reconsidered in consequence.

It was agreed that Mr. Stewart's application should be brought up for consideration later.

N. H. Smith (Minute 754).—It was agreed that the salary of Mr. N. H. Smith be increased from £125 to £150 per annum with normal war bonus on his taking up duty at South Farnborough after the completion of his period of training, provided that a satisfactory report of his work be received at the end of the month.

775. Observatories and Stations.—**South Farnborough.**—*Payment of wages of assistant.*—Reported—that £67 19*s.* 2*d.*, being the accumulated wages of the assistant at the Branch Office, South Farnborough, was due from the authority that had taken over the Aircraft Establishment from the War Office.

It was agreed that the bill be sent to the Superintendent of the Royal Aircraft Establishment for payment.

Patent Application No. 15464/17.—"Improvements in Aerial Circuits for Wireless Telegraphy."—Reported—that the engrossment of the agreement for the Patent Application 15464/17 assigning certain rights to the Government had been received from Mr. Watson Watt duly signed.

It was agreed that the application be forwarded to the Munitions Inventions Department.

Location of Thunderstorms (Minute 709).—Submitted—a report on the Location of Thunderstorms from the Meteorologist-in-Charge, South Farnborough. It was agreed that the report be circulated to the members of the Gassiot Committee and of the Sub-Committee on the Electrification of Balloons.

Determination of Cloud Heights by Searchlight.—Submitted—a report on the determination of cloud heights by searchlight which had been prepared at South Farnborough and was being circulated to the Meteorology Sub-Committee of the Advisory Committee for Aeronautics.

Aberdeen.—*Payment of accounts for lighting installation.*—Reported—correspondence with Professor Niven with regard to the payment of a sum of £57 18*s.* 9*d.*, being the cost of installation of electric light in the observatory premises at Aberdeen.

It was agreed that as the rooms concerned were used solely for the purposes of the Observatory, that the money be paid by the Meteorological Office.

Shoeburyness.—Reported—the receipt of the following note on the work at Shoeburyness :—

M.O. 8052.

Meteorological Work at New Ranges—Shoeburyness.

The work of the Meteorological Section R.E. at Shoeburyness comes under two headings, (1) Observations of Wind, Temperature and Humidity, &c., and (2) Ballistic Computations, in particular the calculations of weighting factors for cross winds, head winds, density, temperature, and elasticity. A brief outline of the work under each of these headings, as well as the method of applying the results, is appended.

(1) OBSERVATIONS.

(*a*) *Wind.*—The wind near the ground is obtained from a Dines Anemometer set on top of a tower at a height of 90 feet from the ground. Winds up to a height of about 10,000 feet are measured in clear weather by releasing pilot balloons and following them with two theodolites. In addition to this, measurements of winds up to 20,000 feet are obtained by means of Anti-Aircraft shell bursts when necessary, as in hazy weather, or at times when the sky is partly covered with low cloud, or when the wind is so strong that the pilot balloon is lost in distance before attaining the height desired.

The reduction of the double theodolite observations is made by a graphical method, which allows two men to complete the computation of winds while the balloon is being followed. The height of the balloon at any moment, and hence its rate of ascent, can be derived directly from the observations, and this yields an estimate of the magnitude of the ascending or descending currents in the atmosphere. The balloon is followed from two out of three possible stations, the pair of stations chosen being selected so that the general wind current is at right angles to the line joining the stations. The home station and one out of the out-stations have a supply of hydrogen and balloons, so that on days when the two out-stations are used no difficulty arises with the filling of balloons. The three stations are practically at the same level and at a distance of about 1,500 yards apart. This length of base is found to be sufficient to give accurate results, and it is found that with a longer base there is considerable difficulty in picking up the balloon from the out-station.

(*b*) *Temperature and Humidity.*—The ground temperature and humidity are obtained by reading wet and dry bulb thermometers in a Stevenson screen. Temperatures and humidities up to 5,000 feet are obtained from a Baro-thermo-hygrograph attached to a small French N-type Kite Balloon capable of being put up to 5,000 feet or more (8,000 feet under very favourable conditions). Temperatures and humidities at still greater heights are obtained from readings of wet and dry bulb thermometers on an aeroplane. Special ascents for this purpose are made by a Squadron of the R.A.F. on the Isle of Grain, by arrangement with the Technical Department of the Air Ministry.

(*c*) *Barometer.*—Readings are taken at standard times as well as at the commencement of each pilot balloon ascent.

(2) BALLISTIC COMPUTATIONS.

A series of weighting factors for cross winds, head winds, density, temperature, and elasticity is being worked out. These computations are made separately for each gun, for a series of values of the ballistic coefficient and muzzle velocity, for a series of different quadrant elevations of the trajectory. It is found that the weighting factors differ fairly considerably even for two trajectories having the same height of vertex, when the muzzle velocity and ballistic coefficients differ This is particularly true of the elasticity weighting factors. During the war a set of average factors was used in the field, but for accurate experimental work it is important to use the set of factors appropriate to the gun and the special conditions of the trial. Further it should be noted that the factors differ for the head and cross winds.

(3) METHODS OF APPLICATION OF THE ABOVE.

When a Range and Accuracy trial is to take place, the Meteor Section is informed the previous day of the nature of the trial, with details of the gun and projectile, line of fire, muzzle velocity, quadrant elevation, time of flight of projectile, and time and duration of the shoot. The height of the vertex of the trajectory is taken to be $4T^2$, where T is the time of flight, and on this basis arrangements are made for the following day for a series of pilot balloon ascents during the trial, as well as for kite balloon and aeroplane ascents for temperatures and humidities.

A preliminary single theodolite pilot-balloon ascent is made an hour before the trial is due to commence, to indicate the nature of the winds to be expected. (If the wind is greater than 40 feet per second at any point of the trajectory the trial is usually postponed.)

During the course of the trial pilot-balloon ascents are made every 45 minutes. The results of these are not communicated immediately, but are kept until a report of the observed results is rendered, usually the next day. This report gives, for each series of rounds fired, the line of fire, the quadrant elevation, the mean observed time of flight, the mean range, and the time of firing. From these data and the observations made during the trial the equivalent constant cross-wind, the equivalent constant head- or following-wind, the ballistic temperature, the elasticity temperature and the tenuity factor are evaluated. The results are submitted in the form shown below.

If ascending or descending currents of five feet per second or more are found to exist in the atmosphere, this is stated in the report. Weighting factors could be evaluated for ascending currents in the same way as for following winds, but in practice this is never done, on account of the uncertain nature of these currents.

12-inch B.L. Howitzer.
Minute 30659.

Trial for Range and Accuracy.
Carried out 3/4/19.

METEOROLOGICAL REPORT.

Rounds.	Assumed Height of Vertex.	Following Wind.	Cross Wind, Left to Right.	Tenuity Factor.	Ballistic Temperature.	Elasticity Temperature.
	Feet.	f/s.	f/s.		F.	F.
2–11... ...	7,700	8	11	1·054	36·2°	32·6°
12–21... ...	7,700	7	11	1·053	36·6°	32·8°
22–31... ...	7,700	5	10	1·052	37·0°	33·0°
32–36... ...	1,950	8	10	1·047	39·4°	—
37–41... ...	1,950	7	7	1·045	39·8°	—
42–46... ...	1,950	7	7	1·044	40·3°	—

NOTE.—Strong vertical currents (ascending) were observed towards the end of this trial.
No elasticity variations are calculated for the lower elevation used in rounds 32 to 46.

Time (G.M.T.).	Barometer.	Dry Bulb.	Wet Bulb.
	Inches.	F.	F.
0700	30·165	35·4°	34·3°
0800	30·17	36·5°	35·4°
0900	30·17	41·1°	40·0°
1000	30·15	43·6°	36·6°
1100	30·145	48·2°	41·2°
1200	30·14	49·5°	41·6°

Edinburgh.—Reported—the receipt of a letter (M.O. 8268) from Mr. Watt enclosing a report on the loss of H.M.S. Campania on 5th November, 1918.

776. Scottish Meteorological Society (Minute 733).—Reported—correspondence (M.O. 7716 and 7748) with the Treasurer of the Scottish Meteorological Society asking for the reconsideration of the prospects and status of the staff of the Edinburgh Office.

It was agreed that a copy of the correspondence be circulated to the members of the Committee and that the matter should be considered in connection with the general question of reconstruction.

777. Annual Report, 1918–1919 (Minute 764).—Reported—that the preparation of the Annual Report was in progress, and that an extract expressing the thanks of the Committee to observers and others who had rendered special assistance during the war had been circulated to the members of the Committee.

It was agreed that, with certain modifications, the extract should be circulated to the persons mentioned therein.

778. Director's Report and Accounts :—

Stock of Instruments.—The Superintendent of Instruments reports as follows on the position with regard to instruments and stores :—

A statement of the commitments in the shape of cost of goods ordered but not yet received on 6th June shows a total of £13,960 for new instruments and £578 for repairs.

Inquiry has been made of Messrs. Short & Mason, Reynolds, and Wilson, Warden & Co. with a view to cancelling outstanding orders for barographs. Messrs. Short & Mason agree to cancel the order for 135 barographs which are not yet begun, but ask that in consideration the 82 which have been begun should be taken at £5 10*s.* instead of £4 (M.O. 7712.) Messrs. Reynolds report that they have completed cases for 70 barograph instruments unpolished, which they offer at 25*s.* each, and do not wish to proceed further with the orders. Messrs. Wilson, Warden & Co. have also undertaken to cancel a portion (40) of their last order.

Orders for anemobiagraphs, microbarographs, &c., have been cancelled, which, including the order of Messrs. Wilson, Warden & Co., make a total of £2,190, so that the figures for commitments can be reduced by that amount.

It was agreed that in the case of Messrs. Short & Mason's order the Office would accept the delivery of the 200 instruments at £4, and that the 70 cases should be purchased from Messrs. Reynolds on the terms set out.

International Meteorology (Minute 762).—Reported—that arrangements were in progress for a meeting of certain members of the old Meteorological Committee to be held in London on 3rd July and following days, and that invitations had been addressed to : M. Angot, Paris ; Col. Chaves, Azores ; Prof. van Everdingen, Utrecht ; Prof. Hildebrandsson, Upsala ; Prof. Maurer, Zurich ; Prof. Palazzo, Rome ; Capt. Ryder, Copenhagen ; Sir F. Stupart, Toronto ; Dr. G. T. Walker, Simla ; and to a representative of the Norwegian Service and of the United States Service.

Comparison of Expenditure during 1918–19 (Minute 769) with the Estimates for the same year (Minute 669). Submitted—the following :—

Salaries.—The M.O. Salaries were £18,300 and the M.O. Observatory Salaries were £6,170, a total of £24,470, or £1,663 above the estimate.

The excess is partly accounted for by some new appointments, but mainly by the increase—on two occasions during 1918—in the amount of War Bonus.

Office Expenses.—The expenditure for Furniture, Library and Insurances and Repairs are below estimate in each case, in the whole by £153, due to smaller demands and the fact that few repairs were executed during the year. Under the heading of Incidental Expenses and Consumable Stores, however, £280 was spent in excess of the estimated amount, of which £70 was paid for publications for sale, and is therefore recoverable ; £114 was paid to H.M. Office of Works for alterations in the Office, &c. ; £37 was paid as fee to Messrs. Price, Waterhouse & Co. for actuarial investigations with regard to the British Rainfall Organization and £66 was paid for carriage of instruments, expenses formerly borne by the Admiralty, but chargeable to the Office under the new arrangement.

Post Office.—The charges for Postage were £549 in excess of estimate, due mainly to the increased rates in operation from June, 1918. The cost of Telephones was also in excess by £145, due to installation of new lines at Cromwell Road and for charges (recoverable) for information supplied to Air Ministry, &c. For Telegrams, however, the payments were £833 less than estimate, but only nine months' accounts were paid during the year.

Travelling Expenses.—The payments under this head were £84 in excess of estimate, but this sum includes several charges for adjustment of instruments for War Office, &c., which were recovered.

Superannuation.—Pensions chargeable are £142 below estimate, due to the death of Mr. J. E. Cullum in January, 1918. Annuities are also £30 down, due to increase of Income Tax from 5*s.* to 6*s.* in the £. The Contribution to Fund is down by £1,000, since no money was invested during 1918–19.

Cost of Instruments.—There is an increase of £18,199 under this head, due to greatly increased purchases for stock. This is recoverable as the instruments are supplied to other departments or private observers.

M.O. Observatories.—Fuel and Lighting shows an increase of £137, due to increased prices of coal and gas. Equipment shows a decrease of £381.

Expenses of Auxiliary Observatories.—Under Telegraphic, Anemographic and W.W.R. Stations there is an increase of £190, due to an increased rate of pay to Lighthouse and other stations and to the establishment of three additional stations. The increase of £95 under Incidental Expenses of Stations and Ships is due to increased payments for Sunshine Cards.

APPROPRIATIONS IN AID.

Subventions.—There is a decrease of £250 because the grant for the Advisory Committee for Aeronautics was dropped by arrangement.

The decrease of £157 from the Royal Society is due to the smaller income from the Gassiot Trust. Against the decrease of £73 from the War Office is to be set the fact that there are certain payments still due to this Office.

Expenses Refunded.—M.O. Observatories—Increase of £47. Auxiliary Observatories and Stations—There is an increase here of £63 due to increased charges for supply of sunshine cards. M.O. Departmental—Increase of £1,346 due to the large receipts by Instruments Division. M.O. Incidental—Increase of £615 due largely to the re-issue of the D.W.R. after the Armistice was signed. M.O. Telegraphic Expenses—Increase of £134, and M.O. Telephonic Expenses, increase of £115, due in both cases to the resumption of the Forecast Services.

Instruments.—Increase of £20,973 due to larger supplies to the services.

Accounts.—Submitted—The following statement of Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 27th May, 1919	6,339	14	10
Receipts from 28th May, 1919	1,463	2	8
	7,802	17	6
Cheques drawn from 28th May, 1919	4,688	1	2
Bank Balance on 24th June, 1919	£3,114	16	4

NINETY-SIXTH MEETING.

South Kensington, S.W.7, 30th July, 1919.

PRESENT:

THE DIRECTOR IN THE CHAIR.

MR. BARSTOW. | THE HYDROGRAPHER.

COLONEL LYONS.

779. The Minutes 770–778 of the Meeting of 25th June, 1919, previously circulated in proof, were taken as read and confirmed.

780. FINANCIAL CONDITIONS OF THE PROPOSED CO-ORDINATED OFFICE (Minute 772). —After discussion of the various alternatives, the Committee were of opinion that in view of the Treasury interpretation of the decision of the Home Affairs Committee of the War Cabinet "that the Office should be transferred as a 'going concern' with a non-surrenderable grant-in-aid as at present under the vote for Scientific Investigation (Civil Services, Class IV., Vote 8, Sub-head B) and self contained as to finance, secretariat, and registry services" and "that no other solution is practicable in order not to break the continuity of the work of the Office" it was desirable for the expenses of the Office, under the control of the Committee, to be charged for the time being upon the grant-in-aid supplemented to meet additional charges; that civilian rates of pay should be prescribed for the co-ordinated State Service, and the cost of additional special Air Services should be borne on the Air vote, until arrangements can be made for the Meteorological Office in a separate chapter in the estimate of the Air Ministry with provision for separate finance, secretariat, and registry.

The scales of payment set out as the basis of computation in a memorandum by the Director, increased by £50 to make them inclusive of the latest award of war bonus, under No. 84, viz.:—

	£		£
Director-General	1,500	Superintendent	650–800
Controller	1,050–1,250	Asst. Superintendent	500–600
Director of Observatory ...	900–1,000	Senior Professional Assistant ...	375–475
Assistant Director	850– 950	Junior Professional Assistant ...	250–350

were provisionally approved with the understanding that they are subject to revision by the findings of a Committee appointed by H.M. Treasury to deal with the question of the salaries in scientific establishments.

It was further agreed to recommend to the Treasury that the appointments specified should be pensionable on the terms in force for the Civil Service.

Subject to any special consideration in the case of officers who are already in the service of the Committee, the appointments would count for pension from the beginning, except those of Junior Professional Assistants, which would count for pension from confirmation after two years.

With these understandings the following recommendations were approved:—

(1) Mr. R. G. K. Lempfert, C.B.E., Superintendent of the Forecast Division since 1910, to be Assistant Director, to take general oversight of observatories and stations contributing observations to the Office and researches connected therewith, with such other duties as the Director may assign, with a provisional salary of £850 per annum inclusive of war bonus under award No. 84. (Minute 754.)

(2) Lieut.-Col. E. Gold, D.S.O., O.B.E., F.R.S., to be Assistant Director in charge of Forecasting, with such other duties as the Director may assign, at the same salary. (Minute 754.)

(3) Mr. R. Corless, O.B.E., to be Superintendent of Instruments, with a salary of £650 per annum inclusive of war bonus under Award No. 84. (Minute 754.)

(4) Capt. D. Brunt to be Superintendent of work for Army Services with such other duties as the Director may assign, with the same salary and on the same conditions. (Minute 774.)

(5) Mr. Carle Salter to be Superintendent for work of British Rainfall, with the same salary and on the same conditions on the understanding that fees for professional work are paid into the general account. (Minute 773.)

The Director was requested to recommend a candidate for appointment as Marine Superintendent, with the same salary and the same conditions, in place of the late Captain Hepworth, to take charge of the collection of observations from ships and other work assigned by the Director.

The Director was requested to prepare a memorandum on the adjustment of the position of members of the staff who have acquired an interest in the provision for superannuation allowance.

781. BRITISH RAINFALL ORGANIZATION (Minute 773).—Reported that the agreement for the transfer of the British Rainfall Organization had been completed on 25th July, 1919, at the offices of Messrs. Druces and Attlee in Billiter Square, E.C. The Director attended for the purpose also Trustees of the Organization and Mr. Francis Druce, Solicitor for the Treasury Solicitor (Sir Alexander Lawrence), Dr. H. R. Mill, and Mr. Carle Salter.

AN AGREEMENT made the 24th day of July, 1919 BETWEEN HUGH ROBERT MILL of 62 Camden Square in the County of London Doctor of Science and CHARLES LEWIS BROOK of Harewood Lodge Meltham in the County of York Esquire CHARLES JOHN PHILIP CAVE of Ditcham Park Petersfield in the County of Southampton a Captain in His Majesty's Army FRANCIS DRUCE of 10 Billiter Square in the City of London Solicitor DOUGLAS WILLIAM FRESHFIELD of Wych Cross Place Forest Row in the County of Sussex D.C.L. Vice-President of the Royal Geographical Society HENRY MELLISH of Hodsock Priory in the County of Nottingham C.B. a Past President of the Royal Meteorological Society and JAMES GEORGE WOOD of Lincoln's Inn in the County of London M.A. Barrister-at-Law and Fellow of the Society of Antiquaries in London (hereinafter called "the Trustees") of the first part the said HUGH ROBERT MILL of the second part and Sir WILLIAM NAPIER SHAW the Director of the Meteorological Office (hereinafter called "the Director" which expression where the context so admits shall include the Director of the Meteorological Office for the time being to the intent that so far as may be these presents and the obligations hereby imposed on the Director shall be binding from time to time on the person holding the office of such Director) of the third part WHEREAS the late George James Symons F.R.S. in or about the year 1860 commenced and thereafter until his death in the year 1900 carried on and developed a system of investigation of the phenomena of the Rainfall in the British Islands by (among other things) the collection tabulating and publishing of records of rainfall at various stations in the United Kingdom established by himself and a large number of persons interested in the subject who for the most part voluntarily and otherwise at his expense made kept and supplied to him such records And in the course of his work he became possessed of large collections of such records and of the results derived therefrom and tabulated by him And he was also the Author and Editor of the works published periodically called "British Rainfall" and "Symons' Meteorological Magazine" AND WHEREAS the said Hugh Robert Mill after the death of the said George James Symons acquired by purchase the whole of the then subsisting records aforesaid and some of the meteorological instruments of the said George James Symons and the Lease of the messuage Number 62 Camden Square hereinafter mentioned where the official and clerical work of the said system had been for many years (since 1866) and has ever since been carried on And the said Hugh Robert Mill after the death of the said George James Symons carried on and has further developed the said system and continued the preparation and publication of the said periodical works AND WHEREAS in the year 1910 the said Hugh Robert Mill was desirous of founding and establishing on a permanent and continuous basis an organization to be called "The British Rainfall Organization" (hereinafter called "the Institution") for the purpose of continuing and extending the operations and work aforesaid AND WHEREAS by an Indenture dated the 8th day of June 1910 and made between the said Hugh Robert Mill of the one part and the Trustees together with Richard Manliffe Barrington Sir Alexander Richardson Binnie and Sir John Murray F.R.S. all since deceased (hereinafter called "the Original Trustees") of the other part after recitals to the effect of the recitals hereinbefore contained and that in order to the founding and establishing the Institution the said Hugh Robert Mill had determined to assign and make over to the Original Trustees all the property described in the Schedule to the Indenture now in recital to be held upon the trusts thereinafter declared concerning the same And that the said leasehold premises had been or were about to be (as they have in fact been) assigned to the Original Trustees for the residue of the term for which the same were then held and that it was intended that the Original Trustees should be registered as owners of the copyright of the publications hereinafter mentioned and that the property in the chattels and other than furniture comprised in the third part of the Schedule to the Indenture now in recital (which comprised such of the chattels hereinafter agreed to be transferred as were then and are still in existence) had been transferred to the Original Trustees by delivery And for the purpose of providing for the expenses of carrying on the work of the Institution so far as the same might not be met by the voluntary contributions of observers and the sales of publications the said Hugh Robert Mill had established an endowment fund in manner therein mentioned and had collected contributions thereto and it was intended that such fund should be further augmented as therein mentioned It was declared that the object of the Institution should be the promotion of the study of the Rainfall of the British Isles in all its aspects encouraging the correct

observation measurement and recording of rainfall collecting and discussing and publishing the data and records and rendering the same available for the use of all persons without distinction whether rainfall observers or members of learned societies or otherwise And that the Original Trustees would hold all the premises so given transferred and assigned to them as therein mentioned and all documents books instruments and other articles and things to be purchased or otherwise acquired as therein mentioned upon trust for the purposes of the Institution and (subject and without prejudice to the powers and provisions therein contained) permit the same to be used accordingly And it was thereby declared that the first Director of the Institution should be the said Hugh Robert Mill And that notwithstanding the appointment of the said Hugh Robert Mill as a Director or Trustee of the Institution he should be at liberty on his own account and for his own benefit to make use of any information as to rainfall acquired by him either before or after the execution of the Indenture now in recital and whether on behalf of the Institution or not for the purpose of advising giving evidence before any Court of Judicature Committee or Arbitrator or lecturing or for any similar purpose and might for the like purpose use or refer to any of the chattels therein mentioned And it was thereby declared that all or any of the trusts and powers vested in or exerciseable by the Original Trustees under the Indenture now in recital should so long as there should not be less than three Trustees thereof be capable of being performed or exercised by a majority of the Trustees thereof for the time being and any action or decision of such majority should be as valid and effectual as it would have been if done or made by all the Trustees for the time being And it was thereby declared for the reasons therein set forth that the powers and discretions thereinafter given to the Trustees were inserted to secure and for the protection of the Trustees and were not intended to be put in operation otherwise than in circumstances of absolute necessity as to which the decision of the Trustees should be conclusive And that subject as aforesaid it should be lawful for the Trustees in their absolute and uncontrolled discretion at any time thereafter but while the said Hugh Robert Mill should remain Director not without his consent in writing to cease to carry on the Institution and to apply the property for the time being subject to the trusts of the Indenture now in recital in accordance with the trusts thereinbefore contained And in lieu of so carrying on the Institution and applying the said property either to transfer and make over the Institution as a going concern and assign and pay all the property for the time being subject to the trusts of the said Indenture to any person or persons or body of persons or corporation or any Government department who or which should be willing to carry on the Institution in accordance with the trusts thereinbefore declared or to close and wind up the Institution And in the event of the said Institution and property being so transferred made over assigned and paid as aforesaid the Trustees might obtain from the person or persons body or corporation or the proper officer of the Government department to whom or to which the same should be so transferred made over assigned and paid such undertaking (whether verbal or in writing) to carry on the said Institution and apply the said property in accordance with the trusts of the Indenture now in recital as the Trustees might think fit or the Trustees might dispense with any such undertaking without being in any way answerable or liable for so doing AND WHEREAS the Trustees after due consideration and for divers reasons which appear to them sufficient have with the consent of the said Hugh Robert Mill decided that circumstances have arisen and exist which render it absolutely necessary in order that the work of the Institution shall be carried on that such transfer and assignment should be effected as is hereinafter agreed upon for the considerations and upon the terms hereinafter expressed And the Director is willing to accept such transfer and assignment and to enter into such arrangement as hereinafter appears NOW THESE PRESENTS WITNESS that for the considerations hereinafter appearing each of the parties hereto so far as the provisions and stipulations hereinafter expressed are to be performed and observed by them respectively hereby agrees with the others and with each of the others of them as follows that is to say :—

1. THE Trustees or (so far as the properties hereinafter specified remain vested in him) the said Hugh Robert Mill will assign to the Director or as the Director shall direct :—

FIRST : THE Copyright of "British Rainfall" and "Symons' Meteorological Magazine" and of "Mill's Pocket Rain Register" and all other publications of the Organization and all stocks of unsold copies of the same.

SECONDLY : ALL the scientific instruments in the garden at 62 Camden Square aforesaid and all the scientific instruments and furniture in the office building in the said garden and in the following four rooms in the messuage 62 Camden Square aforesaid namely the typists' room on the garden floor the library and map room on the ground floor and the store room on the second floor a writing table in the Director's room.

THIRDLY : ALL the stocks of stationery forms blank observation books and all the wood and zinc blocks illustrations which have appeared or are in course of preparation for appearing in any of the said publications.

FOURTHLY : ALL the manuscripts and books on rainfall and meteorology bound or unbound in whatever part of the house or premises they may be including reports of Parliamentary and legal cases and also all current books of reference but not including works dealing exclusively with oceanography or geography or which are of no meteorological interest or having no bearing on rainfall.

FIFTHLY : ALL the maps charts diagrams blank or filled up including the original working copies of such daily monthly and annual rainfall maps as have been prepared.

SIXTHLY : ALL office diaries letter books of correspondence relating to rainfall together with the classified correspondence relating to parliamentary and legal cases and to other matters involving rainfall and all correspondence regarding the work of the Organization which have been preserved and the address books and county books containing lists of rainfall stations.

SEVENTHLY : THE records of monthly totals of rainfall copied from published sources or from the originals in about 213 volumes from before 1800 to 1918.

EIGHTHLY : THE original records of rainfall as received from observers in the British Isles from 1860 inclusive to the present time on various forms.

NINTHLY: All the rain-gauges in the hands of paid observers and others who have received such gauges gratuitously in various parts of the British Isles including those in Wales which formerly belonged to the London County Council and the gauges purchased out of the Nunes bequest so far as the gauges mentioned under this present head can be traced and identified.

2. THERE are excepted from the said transfer all such instruments if any in or about the premises as have been received for testing and have not as yet been returned to their owners and such excepted instruments may be removed by the said Hugh Robert Hill at his pleasure.

3. THE furniture of the kitchen on the garden floor and of the front room of the second floor belongs to the caretaker and is excepted from the said transfer and may be removed by the caretaker at her pleasure.

4. THE Trustees will grant to The Commissioners of His Majesty's Works and Public Buildings and The Commissioners of His Majesty's Works and Public Buildings will accept a lease of the house and garden Number 62 Camden Square aforesaid for a tenancy from year to year from the 24th day of June 1919 determinable at the end of the first or any subsequent year by six calendar months' previous notice in writing to be given by either party at the yearly rent of £70 payable half-yearly subject to the performance and observance by the lessee of the covenants and conditions (other than in respect of the payment of the ground rent) contained in the Lease dated the 12th day of August 1853 under which the Trustees hold the same and the lessee shall covenant to perform and observe such covenants and conditions during the tenancy and indemnify the Trustees in respect thereof.

5. THE Director shall carry on or procure to be carried on upon the said premises Number 62 Camden Square the work now being carried on there by the Institution as in continuation and as nearly as circumstances will permit in the like manner until the work be removed to other and equally suitable offices and so as to avoid any breach in the continuity of the work or in the records now being made and kept there And after such removal will continue the same in like manner And any change in the place where or the manner in which the same shall be carried on shall be made after consultation with the said Hugh Robert Mill so long as he shall be willing to give his advice on the matter.

6. THE Director will in particular maintain and develop the system of voluntary observation of rainfall in the British Isles initiated extended and systematised as hereinbefore recited and be responsible for the custody and preservation at Number 62 Camden Square or other suitable offices all the records and copies of records hereby agreed to be transferred and from time to time furnish on demand free of charge copies of any of the said records to the observers who supply them AND ALSO from time to time furnish to any other person requiring the same a copy of rainfall data from such records at such charge (if any) as shall not exceed the tariff now in use by the Organization and approved by the Trustees.

7. THE Director will continue the publication of an annual volume under the short title of "British Rainfall" with the year to which it relates containing an accurate compendium of the rainfall observations of the year preceding the year of publication in each case on similar lines and in similar form and no less complete than the publication of "British Rainfall" for recent years Such volume relating to the year 1918 and each succeeding year shall be published as early as circumstances will admit (with due regard to the time required for checking records and securing accuracy in compilation) in each year following the year to which the volume relates AND the volume relating to 1918 shall be printed by the printers by whom the volumes relating to 1917 and preceding years were printed.

8. THE Director will in like manner continue the publication of a monthly magazine on the lines of "Symons' Meteorological Magazine" containing a record of work and progress in meteorology notices of books and correspondence on meteorological subjects with the general aim of promoting among observers interest in the Science of Meteorology PROVIDED ALWAYS that such magazine shall be published either under its present name or if incorporated with the "Meteorological Office Circular" (as it may be) the combined publication shall be issued under some such name as "The Monthly Meteorological Magazine and Meteorological Office Circular."

9. THE Director will take over the services of such members of the staff of the British Rainfall Organization who are under the age of 60 years and are willing to join the staff of the Meteorological Office at salaries and under conditions not less favourable in any particular than those which they are at present receiving and working under and so that as members of the staff of the Meteorological Office they shall in all respects receive as favourable treatment as other members of that staff of the like grade and seniority and so that such seniority shall be reckoned as from the date at which the person so joining the staff of the Meteorological Office became a member of the staff of the Organization or entered the service of the said Hugh Robert Mill or his predecessors whichever is the earlier date.

In the case of any member of the staff of the British Rainfall Organization who was formerly employed in the Meteorological Office his seniority shall date from the time when he first entered the service of the Meteorological Office.

10. ALL subscriptions and donations made or promised to the Organization or the said Hugh Robert Mill as payment for the publications of the year 1919 or towards the expenses of the Organization for that year (other than gifts or contributions of the Endowment Fund established under the said Indenture) so far as received by the Trustees or any official of the Organization shall be deemed to have been received on behalf of and shall be accounted for to the Director subject to the deduction or the payment by the Director of all costs and expenses of the Organization incurred or to be incurred as from 31st day of December, 1918.

11. THE said Endowment Fund and all contributions thereto past or future remain the property of the Trustees and are excepted out of this Agreement.

12. IN consideration of the premises the Director shall pay to the Trustees on the day appointed for the transfer of the premises the sum of £5,470.

13. IN further consideration of the premises the Director will save harmless and keep indemnified the Trustees from and against all claims and demands in respect of the future carrying on and maintenance of the work of the British Rainfall Organization save and except in regard to the Endowment Fund aforesaid.

14. THE transfer shall take effect and be completed on the 24th day of July 1919.

15. ALL costs charges and expenses of the Trustees in connection with the preparation and execution of this Agreement and the negotiations leading up thereto and the carrying of the same into effect shall be paid by the Director upon the signature hereof and are agreed at the sum of £105 in addition to disbursements amounting to £9 6*s*. 0*d*.

AS WITNESS the hands of the parties

Signed by the before-named Sir William Napier Shaw in the presence of : NAPIER SHAW.

J. A. CURTIS,

J. P. County of London.

The Director undertook to send Mr. C. E. P. Brooks and Mr. H. L. B. Tarrant to verify the schedule of property to be transferred by delivery, and Mr. C. Salter undertook to take charge of the property on delivery for the Director of the Office. (M.O. 9826.)

It was understood that for the present, in accordance with Minute 773, the work of the Organization would be carried on with as little change as circumstances permit, that Mr. Salter should continue to receive the moneys of the Organization addressed to the Office at 62, Camden Square, and to pay them with the account of the Organization at the National Bank, 189, High Street, N.W. 1, that he should continue to draw cheques on the account for the expenses of the Organization.

It is suggested :—

(1) That a report of the work of the Organization should be presented month by month on the same lines as the reports from the observatories and that the report should include a statement of the receipts and outgoings until the financial arrangements are otherwise ordered.

(2) That salaries should be paid, monthly or weekly as the case may be, by cheque from the Office to the Banking Account of the Organization and distributed thence by cheque payable at the Bank. The form of receipt being the same as in the case of the staff of Eskdalemuir and Valencia.

Approved.

The Director reported that he had had an interview with the Clerk of the Metropolitan Water Board in order to consider what future arrangements would be made with the Board as a result of the transfer of the British Rainfall Organization to the Meteorological Office ; and that he had since received the following letter :—

686.—M.O. 9,823.

Metropolitan Water Board
(Central Offices),
29th July, 1919.

DEAR SIR NAPIER,

Rainfall Returns.

ADVERTING to our interview yesterday I beg to send the following epitome of the agreement made by this Board with Dr. H. R. Mill in 1906 :—

(1) A full monthly report by Dr. Mill on the rainfall in the Thames and Lee Valleys accompanied by an appropriate map showing the distribution of rainfall during the month by means of isohyetal lines and containing any information as to the rainfall of the month which the Water Board might from time to time reasonably require.

(2) Dr. Mill to make an annual inspection of all rain-gauges belonging to the Board, to report from time to time as to their condition and repair and as to any alterations or improvements which he might think requisite or expedient to enable the records taken by such gauges to be as reliable as possible and of no less accuracy than those taken from the rain gauges in use over the rest of the country.

(3) The records taken at the Board's gauges to be published in "British Rainfall" and made use of when occasion requires in "Symons' Meteorological Magazine."

(4) Dr. Mill to supply free of charge nine copies of "British Rainfall" annually and of 'Symons' Meteorological Magazine" monthly to prescribed officials of the Board.

(5) Dr. Mill to hold himself at the disposal of the Water Board as an expert witness on questions relating to rainfall and not to appear as an expert witness in opposition to the Board, unless and until the Board have informed him that they would not require his services in the matter in question.

(6) Payment by the Board to Dr. Mill of £250 per annum half yearly.

(7) Agreement determinable by either side on six calendar months' notice in writing.

I have pleasure in enclosing a copy of the monthly report presented by Dr. Mill for the month of May. I need not send a copy of the map as it is identical with those in Dr. Mill's publications.

You were kind enough to tell me yesterday that you would submit the matter to your Committee to-morrow with a view to your making a communication to me as to future arrangements.

I am, &c.,
A. B. PILLING,
Clerk of the Board.

Sir Napier Shaw, LL.D.,
Meteorological Office,
Exhibition Road,
South Kensington, S.W. 7.

It was agreed that the arrangements should be continued as far as possible on the same terms, but that with regard to paragraph 5 no guarantee could be given that the Organization would not appear as witness in opposition to the Board. It was further agreed that Mr. Salter should undertake the duties formerly performed by Dr. Mill.

782. OFFICE STAFF.—**Superannuation Allowance** (Minute 774).—The following draft letter, previously circulated, was approved for transmission to the Treasury after amendment :—

Meteorological Office,
South Kensington, S.W. 7,
15th August, 1919.

SIR,

THERE are certain points in connection with the scheme of superannuation for the clerical staff of this Office, which was approved by the Treasury in 1899 for the Meteorological Council, and continued by the Meteorological Committee with certain alterations required under the National Insurance Act, 1911, upon which the Committee require instruction. (A copy of the regulation is enclosed.)

Under these regulations the following members of the staff are on pension :—

	Payment commenced.	*Annual amount.* £ s.
R. Strachan	1900	150 0
S. Call	1908	58 15
C. Harding	1911	150 0
A. J. Rigby	1913	112 10
J. A. Curtis	1914	150 0

During the war five of the present members of the staff have passed the age of superannuation, and have been retained in the Office service under a Minute of the Meteorological Committee :—

"Members of the Staff who reach the age of retirement during the war will have their position as regards pension defined and will be at liberty to take up their pensions if they desire to do so.

"In case no other appointment is made to the posts which the retiring members of the Staff occupy, the Director will be authorised to continue the employment of the present holders, beyond the normal age of retirement, and unless the Committee deem it necessary, the new appointments will not take effect until the end of the war.

"In the case of those retained in this manner full pay will be continued until six months after the quarter day next following the declaration of peace."

Of those superannuated two, namely J. A. Curtis and Charles Harding, rejoined the Office staff with a salary of £90, for less than whole time work, in addition to the superannuation allowance of £150 a year. The £90 has subsequently been increased by war bonus computed as being payable on the sum of £240.

Another, Mr. H. Harries, who was a forecaster when he attained the age of 65 years in 1917, in the absence of the Marine Superintendent through illness, undertook duty as Assistant Superintendent in the Marine Division on the death of the Principal Assistant in that division, and on the subsequent death of the Superintendent was appointed "Acting-Superintendent" with a salary of £500 inclusive of war bonus.

The questions which the Committee have now to face are :—

(1) Whether the maximum allowance of £150 a year after approved service of not less than 30 years should hold for pensions now becoming operative, and for the future in face of the increased cost of living ?

(2) Whether the superannuation allowance of those members of the staff who retired before the war should be increased by a charge upon the grant-in-aid of the Meteorological Office ?

(3) What consideration in respect of superannuation should Messrs. Curtis and Harding receive for their extended service during the war ?

(4) What superannuation allowance should Mr. Harries receive ?

The Meteorological Committee propose as follows :—

(1) The maximum allowance should be raised from £150 (as one half of £300) to £210 as being one half of £420, the sum to which the maximum is raised by war bonus under Award No 84, or alternatively the maximum of £150 should be increased by the war bonus for the time being so as to make up the purchasing value of £150 before the war.

(2) The retiring allowances of the persons now superannuated to come under this rule. Full pay to be continued until 31st December, 1919.

(3) In the case of Messrs. Harding and Curtis the allowance to be the new maximum.

(4) On the analogy of the case of Mr. R. H. Curtis, a pensionable clerk, who became Superintendent of the Instruments Division during the last three years of his service, Mr. Harries should receive an addition of £10 to his superannuation allowance as set out in (2), in consideration of his having discharged the duties of Marine Superintendent with success for a year.

(5) No suggestion is made as to the persons pensioned previously to 1914, with the exception of Messrs. Harding and Curtis.

The Committee will be glad to know which, if either, of the alternatives Their Lordships approve.

I am, &c.,
NAPIER SHAW.

The Secretary,
Treasury, Whitehall, S.W. 1.

Reported—M.O. 8,738 from Mr. R. H. Mathews enquiring whether his six years' service in the Customs and Excise would count towards pension in the Meteorological Office in the event of his obtaining an appointment on the staff of the Office.

It was agreed that, under the present conditions, service in another Government Department would not count towards pension in the Office.

Appointment of Marine Superintendent and Nautical Assistant.—Reported—that an application had been received from Commander L. A. Brooke-Smith, R.N.R., for appointment as Marine Superintendent (M.O. 9,321).

It was agreed that in the event of his proving a suitable candidate, appointment should be made on the terms set out in Minute 780.

Reported—a letter (M.O. 9,848) from Lieut. Commander C. H. S. Lapage, R.N., applying for appointment as Assistant to the Marine Superintendent, in place of the late Mr. William Allingham.

Resignations.—H. Fahmy (Minute 774).—Reported—that the resignation of Mr. H. Fahmy, Supernumerary Clerk in the Statistical Division, had been accepted as from 26th July, 1919.

E. P. Pearce (Minute 654).—Reported—that the resignation of Mr. E. P. Pearce, Staff Assistant in the Instruments Division, had been accepted as from 31st July, 1919.

Application for Promotion.—Reported—a letter from Capt. Brunt (M.O. 9,696) recommending Mr. C. E. Britton (Minute 765), Junior Professional Assistant in connection with the work at Artillery Ranges at Shoeburyness, for promotion to Senior Professional Assistant.

It was agreed that Mr. Britton's name should be brought up for consideration when a vacancy occurred.

New Appointments.—Reported—the following Director's Orders for confirmation:—

Order 846 appointing **Frederick George Whitaker**, Technical Assistant, on probation for three months, at a salary of £75 per annum with normal war bonus. The appointment to date from 23rd June, and to be subject to three months' notice on either side after the period of probation.

Order 847 appointing **George Charles Baldwin**, Technical Assistant, on probation for three months, at a salary of £75 per annum with normal war bonus. The appointment to date from 23rd June, and after the period of probation to be subject to three months' notice on either side.

Order 851 appointing **Thomas Clifford Rogers**, Technical Assistant, on probation for three months, at a salary of £75 per annum with normal war bonus. The appointment to date from 14th July, and to be subject to three months' notice on either side after the period of probation.

Order 853 appointing **Henry William Davis**, Technical Assistant, on three months' probation, at a salary of £75 per annum and normal war bonus. The appointment to date from 28th July, and after the period of probation to be subject to three months' notice on either side.

Order 854 appointing **Robert Melodew Stanhope**, Junior Professional Assistant, at a salary of £150 per annum and normal war bonus, with consideration of selection for Senior Professional Assistant in January, 1920, for duty at any of the observatories connected with the Meteorological Office or elsewhere in the United Kingdom. The appointment to date from 28th July, 1919, and to be subject to three months' notice on either side.

Order 859 appointing **Ernest George Ward**, Boy Clerk, at a commencing salary of 16*s.* a week with normal war bonus, on the terms of Circular 002. The appointment to date from 28th July, 1919.

Order 860 appointing **Hector Edwin Brooking**, Probationer, on the terms of Circular 002, with a commencing salary of 17*s.* 6*d.* per week in addition to normal war bonus. The appointment to date from 5th August, 1919, and to be subject to one week's notice on either side.

Order 861 appointing **Charles S. Durst**, Junior Professional Assistant, with consideration of selection for Senior Professional Assistant in March, 1920, for duty at any of the observatories connected with the Meteorological Office or elsewhere in the United Kingdom. The initial salary will be £150 per annum with normal war bonus. The appointment to date from 8th September, and to be terminable by three months' notice on either side.

Order 867 appointing **Charles Kenneth Mackinnon Douglas**, Senior Professional Assistant, with one year's seniority, at a salary of £240 per annum with normal war bonus, for duty at any of the observatories connected with the Meteorological Office or elsewhere in the United Kingdom. The first increment to salary to take effect in April, 1920, and the appointment to date from 5th August, 1919, and to be subject to three months' notice on either side.

Order 868 appointing **Charles Stuart Dunbar**, Probationer in the Meteorological Service, with a view to his taking duty as Technical Assistant after a period of three months, provided he be reported proficient. The salary during the period of probation is 20*s.* 6*d.* per week plus 17*s.* war bonus, and the salary of a Technical Assistant is £75 per annum with normal war bonus. The appointment to date from 28th July, and to be subject, after a period of probation, to three months' notice on either side.

Approved.

M. A. Giblett (Minute 754).—Reported—that Mr. M. A. Giblett, Senior Professional Assistant in the Forecast Division, had volunteered for service in North Russia (Order 850) and had been granted a temporary commission as 2nd Lieutenant in the Royal Engineers with effect from 2nd August. It was recommended that his position on the Office Staff should be kept open for him on his return.

Approved.

Demobilisation.—F. Levin (Minute 754).—Reported—that Mr. F. Levin was demobilised on 19th June, 1919, and would report for duty at South Farnborough on convalescence after hospital.

783. Scottish Meteorological Society.—**Application from the Edinburgh Office** (Minute 776).—Submitted—the following correspondence, previously circulated :—

M.O. 7716.

Scottish Meteorological Society,
122, George Street,
Edinburgh,
4th June, 1919.

Dear Sir,

Mr. Watt has written to me representing that it is reasonable that his own position and that of his assistants in the Edinburgh Office should be clearly defined. He further represents that an additional assistant is urgently required.

I am in complete sympathy with Mr. Watt's point of view, and send you a copy of his letter, as being the simplest way of bringing the matter before the notice of the Meteorological Committee and yourself.

I take it that the staff here come automatically under the latest Civil Service award of war bonus. The figures given in Mr. Watt's letter provide the basis for adjustment.

Believe me, &c.,
William B. Wilson,
Honorary Treasurer.

The Director,
Meteorological Office,
London, S.W.7.

M.O. 7716.

Scottish Meteorological Society,
122, George Street,
Edinburgh,
4th June, 1919.

Dear Mr. Wilson,

I think the time has come when the status and the prospects of myself and the other members of the staff in the Edinburgh Office should be defined. We are grateful for the war bonus awarded to us ; but suggest that our salaries be reconsidered, that a maximum be fixed in each case with annual increments leading up to it, and, generally, that our positions be graded as is the case with the staff in the London Office.

It appears from Sir Napier Shaw's letter to you of 21st December last, that the payments by the Meteorological Committee supplementary to the annual grant of £350, which was fixed in 1913, are to be regarded entirely as of the nature of war bonus. We had assumed that the first supplementary payment of £60 represented a permanent addition to the grant, and have so treated it in our Statement of Account for 1918–19. But on the former interpretation, the salaries at present, with date of last adjustment, are as follows :—

	Salary as at 1st April, 1919.	*Last Adjustment.*
Mr. Watt	£320	November, 1914.
Miss Crawford	75	„ 1916.
Miss Hume	65	„ 1916.

As regards my own position, I rank as a Superintendent and my record and qualifications are known. The real value of a salary depends on whether or not there is a retiring allowance attached to it, and a reasonable increase with some reasonable arrangement for superannuation would be

agreeable to me. Failing such an arrangement, I feel that I should have an immediate and considerable increase and that my salary should rise rapidly to a fairly high maximum. I am at present in my 50th year, and have received no increase for nearly five years. It may be noted that £50 of my salary is paid by the Society.

As regards the two lady assistants, their remuneration is inadequate, and I may recall that about five years ago the Director offered either of them a position in his own Office, with good prospects, at an initial salary higher than either of them now receives. Miss Crawford joined the staff in January, 1913, and has shown remarkable capacity. I suggest that she be graded forthwith for salary as "clerk" (M.O. Circular 002, p. 4) at an initial salary of £125. Miss Hume joined the staff in October, 1913, and has done good work. I suggest that she be graded as "Clerk Computer" and receive forthwith the final salary of that grade (£110). Both ladies should be eligible for superannuation : their entire salaries are paid out of Government money.

I have for several years past in my annual Report to the Director represented that a third assistant was urgently required in the Office, and I now press for this. She should be well-educated and an expert typist, and we should not offer a commencing salary of less than £75, plus war bonus. The other salaries would, of course, at any level to which they may be adjusted carry with them the appropriate war bonus, and I take it that, in any case, we automatically come under the new award of 1st April, 1919.

I shall be glad to know how you regard these suggestions. If you agree generally with my point of view, perhaps you will be good enough to refer the matter to the Director for his consideration.

I am, &c.,
ANDREW WATT.

W. B. Wilson, Esq.,
Honorary Treasurer,
Scottish Meteorological Society,
Edinburgh.

The consideration of the application was postponed to a later date.

784. ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION (Minute 750).—Reported —the receipt of M.O. 9,267 from the Department of Scientific and Industrial Research enclosing a copy of a letter which had been sent to the Air Ministry with regard to the renewal of the grant-in-aid of the investigation into Atmospheric Pollution.

The following draft reply (previously circulated) was approved for transmission to the Department of Scientific and Industrial Research : —

Meteorological Office,
South Kensington,
London, S.W. 7,
4th August, 1919.

SIR,

WITH reference to your letter and enclosure of 14th July, 1919, I beg leave to say that I have brought it before the Advisory Committee for Atmospheric Pollution and they have referred it to the Meteorological Committee with a request for it to be dealt with.

The Committee fully understand the difficulty of financing scientific enterprises which are attached to a ministry by grants from another department of State. They think the natural mode of procedure at the present juncture would be for the investigation of atmospheric pollution to be recognised as an approved part of the responsibility of the Meteorological Office, and for the expenses in connection therewith, hitherto defrayed by the grant from the Department of Scientific and Industrial Research, to be carried now on the vote for meteorology.

They are of opinion that the work is of substantial importance in the vital question of fuel economy, and that it is essentially a work in which the local authorities and some central authority should co-operate, and that the Advisory Committee have shown their capacity for carrying the work on efficiently, and that there is still considerable scope for the development of the field of inquiry. They would like to make more ample provision for the Secretary, upon whom the greater part of the work falls, than the honorarium of £100 a year which the Advisory Committee put forward, provided that a suitable arrangement can be made.

If the Department concurs in these views and would be willing to carry on the financial provision, until a decision has been arrived at about the proposal, the Meteorological Committee, in formulating the terms of the co-ordination of the Meteorological Services under the Air Ministry, would put forward a scheme including provision for the investigation of atmospheric pollution.

As you ask for my personal views, may I be allowed to say that in putting forward the proposal to the Air Ministry I do not think it is at all necessary, and therefore, in a sense, it is undesirable, to make out any case for the investigation of atmospheric pollution as of direct interest to aerial navigation. All that it is necessary to claim for it is that it is for the public advantage. If the Air Ministry take over the responsibility to Parliament for the meteorological work, they must take over with it the responsibility of the Meteorological Office for the supply of meteorological information, which can be claimed in the public interest by other departments or the general public.

The obligation to meet the needs of other departments, subject of course to the provision of the out-of-pocket expenses, is a "debenture obligation" of the department which is responsible for the grant for meteorology. It would be a grave mistake to regard the Air Ministry as responsible only for the supply of information to other departments when its own needs have been satisfied. It is just the other way, and therefore the claim for undertaking any enterprise that can be legitimately included in meteorology is now, as heretofore, not that it is useful to the department that has the control, but that it is required in the public interest. The Committee on Fuel Economy will no doubt have formed an opinion upon the subject.

I would, therefore, like at this juncture to learn from the Department that they regard the case for the Investigation of Atmospheric Pollution as of public importance, to be sufficiently well made out to justify the inclusion of a sum for expenses within the vote for meteorology, and that the Department would be willing to extend its grant to cover the period until a decision has been arrived at as to the proposal for a more permanent arrangement.

I am, &c.,
NAPIER SHAW.

The Secretary,
Department of Scientific and Industrial Research,
15, Great George Street, S.W.1.

785. INTERNATIONAL METEOROLOGY (Minute 778).—Reported—that arrangements were in progress for the conference of meteorologists to be held in Paris on the invitation of the French Government, commencing on Tuesday, 30th September, 1919. Also for a meeting in London of the chiefs of the various meteorological services of British Dominions and Protectorates on 23rd September and following days. The following Directors have been reported as intending to be present: Captain A. J. Bamford, Ceylon; Lt.-Col. D. C. Bates, New Zealand; Mr. H. A. Hunt, Australia; Mr. H. Knox Shaw, Egypt; Mr. C. Stewart, South Africa; Sir Frederick Stupart, Canada; Dr. G. T. Walker, India.

Meetings of surviving members of the International Meteorological Committee, viz., MM. A. Angot, Paris; van Everdingen, Utrecht; Palazzo, Rome; Ryder, Copenhagen; G. T. Walker, Simla; with Director Wallén (Stockholm) in place of Professor Hildebrandsson, Director Hesselberg in place of the late Dr. Mohn, Dr. Bauer representing the Chief of the United States Weather Bureau, and Lieut. Grant, Superintendent of the Admiralty Meteorological Service, were held at the Office on 3th, 4th, 5th, 7th, 8th, and 9th July. Minutes of the proceedings have been prepared and submitted.

786. PUBLICATIONS.—Authority was given for the following publications:—

Memorandum on Atmospheric Visibility by Sir Napier Shaw, F.R.S., previously published by the Hydrographic Department.

M.O. 237. **Report of the International Meteorological Committee**, London, 1919.

787. DIRECTOR'S REPORT AND ACCOUNTS:—

The Director with Colonel Lyons attended a Conference at the Air Ministry on 9th July, 1919, at which various representatives of the Air Ministry were present. The Hydrographer and Mr. Barstow were unavoidably absent. It was arranged that a letter should be sent to the Treasury suggesting the terms upon which the Meteorological Service of the Air Ministry should be placed in charge of the Director of the Meteorological Office as from 1st July, 1919, and it was agreed that if the proposal were approved by the Treasury further details should be arranged by a Committee on a scheme to be proposed by the Director.

In accordance with the request of the meeting the Director has divided his time between the Air Ministry, Kingsway, at which a room, No. 508, has been assigned to him, and the Office; and has become informally responsible for the Meteorological Service of the Air Ministry.

On 17th July the Director was summoned to attend a meeting of the Committee of the War Cabinet upon accommodation. General Sykes and Mr. Mc Anally attended for the Air Ministry. A memorandum by the Director was put forward, expressing the requirements of the proposed comprehensive office at 36,000 square feet, increased on inquiry by Colonel Summers on behalf of the Air Ministry to 39,000 square feet. It was explained by the Chairman, Sir Alfred Mond, that the provision of so large an amount of accommodation in one building in the neighbourhood of Whitehall could not be regarded as an immediate possibility. Upon the representation that it was imperative to have at least a co-ordinated scheme of forecasting, and that the headquarters of the Meteorological Service should be in the same building with Civil Aviation, the suggestion was made that accommodation might be provided to the extent of 9,000 square feet for headquarters and the forecast division, and provision made also for the transfer of the printing office. The proposal in that form was pronounced to be a matter for internal arrangement of the Air Ministry into which the Committee of Cabinet need not enter, and there the matter stands for the present.

Stock of Instruments (Minute 778).—Reported—that with reference to the Committee's decision to allow the deliveries under the orders with Short and Mason, Ltd., to go forward, the Superintendent of Instruments had had an interview with Mr. Arnison, managing director of Short and Mason's, at which it was reported that Short and Mason incurred loss on every instrument delivered to the Meteorological Office at the contract price, and also that their instruments were on sale in London at prices below those they themselves quoted, and that these instruments had come from the Meteorological Office. Mr. Arnison asked therefore for the reconsideration of the Committee's decision.

The Director reported also that he had himself seen Mr. Arnison and recommended that under the circumstances it would be advisable to agree to the proposal of Short and Mason's letter of 5th June (M.O. 7,712), viz., the price of their barographs for future deliveries should be £5 10*s.*; that the Office should (1) accept the 82 barographs at that price and that the remainder of the order should be cancelled, and (2) agree to the advance in the price of the outstanding 16 thermographs under construction from £3 13*s.* 6*d.* + 10% to £5.

Approved.

Submitted—The following Statement of Accounts for the three months ended 30th June, 1919, prepared for audit by the Comptroller and Auditor-General:—

RECEIPTS.							PAYMENTS.					
1918. £ s. d.		£ s. d.		1919. £ s. d.			1918. £ s. d.		£ s. d.		1919. £ s. d.	
99 14 10	Balance from year 1918–19	—		108 10 0			250 0 0	Advisor and Director ...	—		250 0 0	
9,375 0 0	Parliamentary vote..	—		11,750 0 0			26 17 6	Acting Director—Col. H. G. Lyons ...	—		13 8 9	
	DEPARTMENTAL EXPENSES REPAID:							OFFICE SALARIES (including Insurance):				
2 10 6	Forecasts, &c. ...	16 4 10					3,240 2 7	Monthly	5,153 10 2			
28 1 4	Marine, Statistical, and Administrative	40 3 2					690 14 1	Weekly	680 0 10		5,833 11 0	
227 7 11	Instruments ...	236 2 5					173 13 4	EXPENSES OF OFFICE: Rent, Heating, and Lighting	175 3 0			
	INCIDENTAL EXPENSES REPAID:			292 10 5			17 10 9	Furniture and Equipment	5 10 11			
73 19 5	D.W. Report ...	107 11 7					3 9 4	Library	49 6 3			
38 2 1	Divisional... ...	42 6 5					3 3 9	Insurances and Repairs	13 10 3			
3 14 7	Advertising Account	4 10 1					71 0 10	Incidental Expenses, and Consumable Stores	86 8 6			
				154 8 1			1 17 6	Advertising Account ...	—		329 18 11	
25 19 0	STATIONERY OFFICE	—		68 5 11			233 2 0	POST OFFICE: Postage	321 13 3			
117 12 0	TELEGRAPH CHARGES REPAID	—		21 19 11			140 18 2	Telephones	126 17 8			
							927 8 7	Telegrams	418 11 8		867 2 7	
53 14 6	TELEPHONE CHARGES REPAID	—		60 19 10			—	STATIONERY OFFICE ..	—			
							22 3 11	TRAVELLING EXPENSES	—		31 14 1	
—	INSPECTIONS ...	—		8 0 0			6 5 0	SUPERANNUATION: Pensions not chargeable on Fund ...	3 9 10			
4,444 5 4	INSTRUMENTS: By sales from Stock	—		4,993 11 4			33 0 6	Pensions chargeable on Fund	26 6 5			
							133 2 6	Annuities	155 12 6			
	SUPERANNUATION ACCOUNT:						—	Contribution to Fund	—			
140 12 6	Annuities	133 2 6									185 8 9	
24 18 0	Interest on Investments	24 18 0					623 16 0	COST OF INSTRUMENTS: Royal Navy	—			
				158 0 6			4,834 7 11	For Stock	7,005 15 8		7,005 15 8	
	*OBSERVATORIES, BRANCHES, AND STATIONS:							*OBSERVATORIES, BRANCHES, AND STATIONS:				
154 19 3	Richmond... ...	2 4 0					616 19 6	Richmond	952 9 10			
501 15 5	Eskdalemuir ...	7 3 3					465 5 4	Eskdalemuir	601 1 9			
6 9 0	Cahirciveen ...	6 9 0					208 7 0	Cahirciveen	318 13 7			
—	Farnborough ...	—					225 8 1	Farnborough	140 19 0			
1 2 4	Falmouth... ...	—					120 18 9	Falmouth	100 14 4			
—	Benson	—					137 15 3	Benson	162 15 0			
—	Edinburgh ...	—					117 17 3	Edinburgh	122 12 6			
—	Investigation of Atmospheric Pollution ...	—					154 15 11	Investigation of Atmospheric Pollution	44 0 8			
61 10 10	Miscellaneous ...	70 1 7					478 11 0	Miscellaneous ...	427 13 9			
				85 17 10			—	Shoeburyness... ...	110 0 2			
							—	Aberdeen	22 3 1			
3 0 0	National War Bonds	—		—			1,221 12 1	Balance due to Bank on April 1st, 1919...	—		3,003 3 8	
											49 0 4	
							103 2 7	BALANCE: Cash at Bank... ...	7 8 7			
							101 1 10	,, at Office ...	125 11 6			
											133 0 1	
£15,384 8 10				£17,702 3 10			£15,384 8 10				£17,702 3 10	

* For details, *see* separate statement.

Statement of Assets and Liabilities at 30th June, 1919.

LIABILITIES.						ASSETS.					
£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.	
8,623 5 3	To sundry creditors	7,865 1 4				204 4 5	By cash at Office...	133 0 1			
726 8 6	,, superannuation	1,726 8 6				23 18 2	,, salaries reserved (premiums) ...	23 18 2			
562 4 8	,, balance	5,901 14 10				4,717 12 4	,, M.O. instruments in stock	12,087 7 8			
						1,837 11 5	,, sundry debtors	2,540 14 2			
						3,128 12 1	,, Admiralty	708 4 7			
£9,911 18 5		15,493 4 8				£9,911 18 5		15,493 4 8			

NOTE.—On 30th June the amount of Government securities held for the provision of Superannuation Annuities was £26 14*s.* 2*d.* 2½ per cent. Consols, and £989 9*s.* 6*d.* 5 per cent. War Loan

Observatories.—Statement of Accounts for the three months ended 30th June, 1919 :—

RICHMOND.

1918. £ s. d.	*Receipts.*	1919. £ s. d.	1918. £ s. d.	*Payments.*	£ s. d.	1919. £ s. d.
—	Subventions, Scott Antarctic Fund	—	599 17 5	Salaries, Scheduled	843 10 1	
110 2 2	,, Gassiot Trust ...	—	8 8 0	Sunday and holiday duty	9 2 11	
31 13 4	Expenses refunded locally ...	2 0 0				852 13 0
—	Tests and Commissions	—	—	Cost of forms, &c.		—
13 3 9	Cost of books and forms refunded	4 0	3 10 9	Rent, Rates, Taxes, Repairs and Insurance		3 1 6
462 0 3	Balance	950 5 10	31 15 3	Fuel and lighting		37 2 7
			4 19 9	Equipment and instruments ...		—
			20 19 0	Consumable stores		25 8 2
			2 15 8	Incidental expenses		10 4 4
			2 5 6	Books, &c.		—
			31 19 4	Postage, telephones and telegrams		24 0 3
			8 10	Travelling expenses		—
£616 19 6		£952 9 10	£616 19 6			£952 9 10

ESKDALEMUIR.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
500 0 0	Subvention, Royal Society ...	—	327 3 0	Salaries, Scheduled	443 3 1
1 15 5	Expenses refunded locally ...	7 3 3	10 3	Cost of forms, &c.	—
—	Balance	593 18 6	2 5 3	Rent, Rates, Taxes, Repairs and Insurance	5 3 11
			57 7 3	Fuel and lighting	66 4 8
			1 5 0	Equipment and instruments ...	18 7 8
			4 2 11	Consumable stores...	5 4 1
			2 5	Incidental expenses	5 6 11
			11 1 10	Books, &c.	5 11 4
			25 18 10	Postage, telephones and telegrams	34 12 4
			35 8 7	Travelling and motor car expenses	17 7 9
			36 10 1	Balance	—
£501 15 5		£601 1 9	£501 15 5		£601 1 9

CAHIRCIVEEN.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Subventions (Rosse Fund) ...	—	170 12 3	Salaries, Scheduled	273 19 1
6 9 0	Expenses refunded locally ...	6 9 0	—	Cost of forms	—
201 18 0	Balance	312 4 7	5 10 0	Rent, Rates, Taxes, Repairs and Insurance	8 13 8
			3 12 0	Fuel and lighting	2 15 8
			11 9	Equipment and instruments ...	5 0 3
			1 17 7	Consumable stores	1 16 7
			3 9 1	Incidental expenses	3 18 8
			2 15 11	Books, &c.	1 0 6
			19 18 5	Postage, telephones and telegrams	20 2 11
			—	Travelling expenses	1 6 3
£208 7 0		£318 13 7	£208 7 0		£318 13 7

FARNBOROUGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Subvention (Advisory Committee for Aeronautics)	—	185 6 6	Salaries, Scheduled	140 0 4
			4 2 6	Overtime, &c.	—
—	Expenses refunded (War Office) ...	—	—	Cost of forms	—
225 8 1	Balance	140 19 0	6 4	Rent, Rates, Taxes, Repairs and Insurance	—
			—	Fuel and lighting	—
			—	Equipment and instruments ...	—
			—	Consumable stores	—
			16 3 2	Incidental expenses	11 6
			2 5 6	Books, &c.	2 6
			17 4 1	Postage, telephones and telegrams	4 8
			—	Travelling and motor car expenses	—
£225 8 1		£140 19 0	£225 8 1		£140 19 0

FALMOUTH.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
1 2 4	Expenses refunded locally... ...	—	15 0 0	R. Cornwall Polytechnic Society	—
119 16 5	Balance	100 14 4	79 3 11	Salaries, Scheduled	73 15 9
			—	Rent, Rates, Taxes, Repairs and Insurance	—
			—	Equipment and instruments ...	—
			1 9	Consumable stores	1 4
			—	Incidental expenses	8 4
			17 6	Books, &c.	—
			23 13 8	Postage, telephones and telegrams	26 8 11
			2 1 11	Travelling expenses	—
£120 18 9		£100 14 4	£120 18 9		£100 14 4

BENSON.

1918.	*Receipts.*	1919.	1918.	*Payments.*	1919.
£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Expenses refunded locally ...	—	112 12 6	Salaries, Scheduled...	139 11 6
137 15 3	Balance	162 15 0	—	Overtime, &c.	—
			—	Cost of forms, &c.	—
			—	Rent, Rates, Taxes, Repairs and Insurance	—
			10 0	Fuel and lighting	2 5 0
			1 10 0	Equipment and instruments ...	—
			5 8 11	Consumable stores	2 3 7
			10 0	Incidental expenses	2 7 1
			17 6	Books, &c.	—
			15 12 9	Postage, telephones and telegrams	16 7 10
			13 7	Travelling expenses	—
£137 15 3		£162 15 0	£137 15 3		£162 15 0

EDINBURGH.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
117 17 3	Balance	122 12 6	102 10 0	Subvention	122 12 6
			15 7 3	Travelling expenses	—
£117 17 3		£122 12 6	£117 17 3		£122 12 6

COMMMITTEE ON ATMOSPHERIC POLLUTION.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Subvention	—	25 0 0	Salaries, Scheduled...	4 15 6
154 15 11	Balance	44 0 8	9 19 2	Overtime, &c...	6 10 0
			9 1	Equipment and instruments ...	7 17 7
			1 11 6	Consumable stores	—
			114 2 8	Incidental expenses (including printing of report)	6 3 6
			3 13 6	Books, &c.	—
			—	Postage, telephones and telegrams	2 0 0
			—	Travelling expenses	16 14 1
£154 15 11		£44 0 8	£154 15 11		£44 0 8

MISCELLANEOUS.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
6 15 0	Expenses refunded locally ...	—	86 2 6	Subventions: Aberdeen, Armagh	86 2 6
54 15 10	Cost of forms refunded	70 1 7	213 9 3	Salaries of Observers (40) ...	195 13 6
417 0 2	Balance	357 12 2	—	Overtime	—
			154 15 0	Cost of forms, &c.	122 4 5
			2 12 5	Rent, Rates, Taxes, Repairs and Insurance	—
			—	Fuel and lighting	—
			4 2 6	Equipment and instruments ...	4 5 6
			—	Consumable stores	18 3
			15 0	Incidental expenses, &c.	1 11 11
			17 6	Books, &c.	—
			15 16 10	Postage, telephones and telegrams	16 17 8
£478 11 0		£427 13 9	£478 11 0		£427 13 9

SHOEBURYNESS.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Balance	110 0 2	—	Salaries	110 0 2
£ —		£110 0 2	£ —		£110 0 2

ABERDEEN.

£ s. d.		£ s. d.	£ s. d.		£ s. d.
—	Balance	22 3 1	—	Salaries	22 3 1
£ —		£22 3 1	£ —		£22 3 1

METEOROLOGICAL FIELD SERVICE.

FRANCE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
1,480 1 3	War Office	20 2 11		Salaries:		
—	Balance	43 18 8	4 13 8	Major E. Gold ...	—	
			21 17 8			
			—	Capt. A. H. R. Goldie	—	
			1 9 0	Sergt. R. Pyser ...	7 5 9	
			2 9 6	Sergt. E. L. Clinch	15 17 2	
			12 3 10	Corpl. A. G. Goad ...	5 17 11	
			2 9 6	Corpl. C. F. J. Jestico	14 6 8	
			—	Sergt. R. M. Poulter	—	
						43 7 6
			6 7 5	Salaries refunded ...	—	
				Incidental Expenses:		
			—	Postage	1 8 7	
			—	Telegrams ...	—	
			—	Printed books ...	4 12 0	
			—	Miscellaneous ...	—	
						6 0 7
			774 8 2	Instruments		14 13 6
			654 2 6	Balance		—
£1,480 1 3		£64 1 7	£1,480 1 3			£64 1 7

DARDANELLES.

1918. £ s. d.	Receipts.		1919. £ s. d.	1918. £ s. d.	Payments.		1919. £ s. d.
—	Admiralty	—			Salaries:		
262 11 4	War Office	—		2 9 6	Sergt. C. V. Ockenden		—
164 1 2	Balance		4		Incidental Expenses:		
				2 5 2	Postage	4	
				202 6 9	Telegrams ...	—	
				—	Printed books ...	—	
				—	Miscellaneous ...	—	
							4
				219 11 1	Instruments		—
£426 12 6			4	£426 12 6			4

R.E. (HOME.)

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	War Office	9 14 0		Salaries:		
—	Balance	13 13 0	—	Sgt. C. V. Ockenden		13 13 0
			—	Instruments		9 14 0
—		£23 7 0	—			£23 7 0

NORTH RUSSIAN (SYREN) EXPEDITIONARY FORCE.

£ s. d.		£ s. d.	£ s. d.		£ s. d.	£ s. d.
—	War Office	484 10 7		Salaries :—		
—	Balance	—	—	Sgt. F. M. Poulter	11 0 9	
			—	W. J. Fowler ...	2 16 0	
						13 16 9
			—	Instruments		129 2 7
			—	Balance		341 11 3
—		£484 10 7	—			£484 10 7

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on 24th June, 1919	3,114	16	4
Receipts from 25th June, 1919	13,720	17	10
	16,835	14	2
Cheques drawn from 25th June, 1919	12,401	2	8
Bank Balance on 29th July, 1919	4,434	11	6

NINETY-SEVENTH MEETING.

Air Ministry, W.C.2.
15th October, 1919.

A meeting of the Committee was summoned by instruction of the Air Council for Wednesday, 15th October, 1919.

There were present :—

Major-General Seely, C.B., C.M.G., D.S.O., M.P., Parliamentary Under Secretary of State ; Major-General Sir F. H. Sykes, K.C.B., C.M.G., Controller-General of Civil Aviation ; H. McAnally, Secretary of the Air Ministry ; J. S. Ross, C.B.E., F. G. L. Bertram, O.B.E.

Sir Napier Shaw, Director ; Rear-Admiral Learmonth, Hydrographer to the Navy ; Dr. Arthur Schuster, F.R.S., Sir Thomas Middleton, K.B.E., C.B.

Lieut. Grant, Superintendent of the Meteorological Service of the Admiralty, also attended.

Major-General Seely occupied the Chair.

A letter of apology for absence on account of illness from Colonel Lyons was read.

The ordinary business of the meeting of the Committee was preceded by a consideration of the procedure for the co-ordination of the Meteorological Services on the lines set out in the recommendations of the Sub-Committee of the Research Committee (R.C. 12, G.T. 7173), in accordance with the decision of the Committee of Home Affairs of May 8th, 1919, communicated by the War Cabinet under date 23rd May, 1919 (G. 244, M.O. 07418/19). The minutes of the discussion communicated by the Secretary of the Department of Civil Aviation of the Air Ministry are as follows :

The Under Secretary of State referred to the decision reached by the Home Affairs Committee of the War Cabinet on May 8th, 1919, that the Meteorological Service should be co-ordinated and attached to the Air Ministry (Minute 762) ; and also to the Treasury letter of 23rd June, 1919 (Minute 772), with reference to this decision.

788. NEW METEOROLOGICAL OFFICE.—After discussion, it was agreed :—

Constitution.—

(A) That the Meteorological Committee under the Air Ministry should be constituted as follows :—

PRESIDENT—The C.G.C.A. as the Member of Council to whom the Meteorological Office was responsible.

CHAIRMAN—Sir Napier Shaw, Director of the Meteorological Office,

with one representative from :—

Admiralty,
Board of Agriculture,
Board of Trade,
War Office

two representatives from the Royal Society, and

two representatives from the Air Ministry : (Mr. McAnally, and a representative from the Finance Department).

Other persons required for special subjects may be invited to attend.

(B) Mr. McAnally should enquire from Mr. Barstow his views with regard to the representation of the Treasury on the Committee.

(C) The Colonial Office should be approached with the object of finding out if they wished it represented on the Committee.

(D) The Royal Society should be asked if they would agree that one of their representatives should also be a member of the Research Council of Geophysics.

(E) Letters to be sent to the several Departments asking for the appointment of representatives.

Finance.—Mr. Ross raised the question of the Accounting Officer for the Meteorological Office, and promised to make personal enquiries at the Treasury with regard to the date from which an Air Ministry Accounting Officer should be appointed in succession to Sir Napier Shaw, who is the present Accounting Officer.

Sir Napier Shaw in reply to a question by the Under Secretary of State stated that so far as he could tell at present, the grant in aid which runs until the end of the present Financial Year, would not be exceeded except with regard to :—

1. War Bonus—about £6,000.
2. British Rainfall Organization, which has only recently been taken over by the Meteorological Office, £5000.

Publications.—It was agreed that the issue of publications, including the Annual Report, should be on the authority of the Meteorological Committee acting on behalf of the Air Council.

The questions brought forward for decision by Sir Napier Shaw dealing with the staff and running of the Meteorological Office are dealt with in Sir Napier Shaw's Minutes of this meeting, which combine a Conference and an ordinary meeting of the Committee.

Next Meeting.—It was agreed that the next meeting of the Meteorological Committee should be held on November 5th, at 2.30 p.m., in the Council Room, Air Ministry, at which it was hoped the representatives appointed by the other Government Departments would be present.

The Minutes 770–778 of the meeting of 25th June, and the Minutes 779–787 of the Meeting of 30th July, previously circulated were taken as read and confirmed.

789. Annual Report 1918–19 (Minute 777)—Submitted—revise of the fourteenth Annual Report previously circulated. Authority was given for the signature of the report.

790. Correspondence.—*Arrangements with the Air Ministry* (Minute 772)—The Director reported that no further communication had been received from the Treasury respecting the arrangements indicated Treasury letter 23902/19 Minute 772.

On August 27th a Conference was held at the Air Ministry to consider a proposal from the Directorate of Research that all research in meteorology should be in charge of that Directorate, and not form part of the duty of the Meteorological Service. The proposal was not favoured by the Conference.

Conferences have also been held on the arrangements for obtaining observations from ships by wireless, and on the scale for visibility and fog.

791. Programme of work and Estimates for 1920–21.—The Director indicated in general outline the programme of work for 1920–21, as including the maintenance of the activities of the established observatories of the Meteorological Office, with the co-operation of the Gassiot Committee of the Royal Society and the continuance of the climatological and geophysical work represented by the various parts of the British Meteorological and Magnetic Year Book ; the incorporation of the work of the British Rainfall Organization and of the Committee for the Investigation at Atmospheric Pollution in co-operation with Municipal Authorities in various parts of the country ; the co-operation with the Local Authorities and Local Committees of Health Resorts in the daily reports of weather which were used for the information of the public and in connection with the scheme of holiday insurance, which had been developed by various insurance agencies ; and the incorporation of the services of the Air Ministry, which at the time of the Armistice included observations of the ordinary meteorological elements and observations of pilot balloons and with kite balloons, and of shell-bursts at about forty stations which were originally set up by the Meteorological Service of the Admiralty in connection with the Coast patrol.

It was pointed out that the work in connection with the Air Services required complete re-organization in view of the fact that the information was no longer required for Coast patrol, but had now to be arranged to meet the requirements of the Royal Air Force and of Civil Aviation for which aerodromes on selected air-routes were in process of selection. Meteorological information of general and local character was required to be communicated to officers of the R.A.F. and those interested in Civil Aviation, either as pilots or as representative of the owners of aircraft. A provisional list of twenty Aerodromes in the British Isles had been drawn up at which the information was available, and an order of priority, among the selected aerodromes had been assigned for the guidance of the meteorological authorities in the disposal of the funds available for this purpose.

It was further pointed out that the extension of the meteorological system to provide adequate information for aircraft made a very large addition to the expense for two reasons. (1) As regards the stations which contributed telegraphic reports to form the material for the daily weather reports, because a number of stations for the observations of pilot balloons and other special observations of the upper air were required. For these stations, in contradistinction to the ordinary telegraphic reporting stations of the Meteorological Office at which only direct readings of instruments were required, and which would be maintained at a cost of about £30 a year each, the observations of pilot balloons, etc., necessitate the whole time employment of skilled computers and the cost of a station becomes at least £400 a year with a correspondingly higher figure if night observations are included. Seven of the observatories and stations of the Meteorological Office have been accustomed to contribute observations of this character, but for the purpose of obtaining information sufficient to give a map of the distribution of currents in the upper air over

the whole of the British Isles additional stations for contributive purposes are required at some of the outlying points on the coasts where stations were established in connection with the patrol of the coast, but are not on recognised air-routes or those selected by the Royal Air Force. (2) As regards the distributive stations which are to be used to give general and local information necessary for aircraft in accordance with the selected list, it has to be borne in mind that the action of owners and pilots may be guided by the information and advice given, and therefore that the question of the safety of life and property may be involved. It is recognised that to obtain satisfactory results from the system those who are to take action with regard to aircraft must be able to discuss the elements of the situation with a trained expert official who is in possession of full local and general information, and is competent to form an expert opinion of the bearing of the information upon the proposed conditions of the flight. The personal communication may take place in some cases by telephone, but local information must be obtained by special local observations in charge of a competent official, and for different districts comprising a number of such distributive stations, *e.g.*, England S.E., England S., Midland Counties, and so on, a superior official must be in charge and the whole system carefully and continuously supervised and inspected from head quarters. The cost of each of such stations is of the order of £1,000 or £2,000.

Special consideration is necessary for stations at which kite-balloons are to be used or observations of shell-bursts with Hill's Mirrors are to be made. Kite-balloons are a very valuable means of observation and should beinstalled at a select number of stations perhaps nine altogether but they cannot be used at frequented aerodromes. They should indeed be at a safe distance from the lines of aerial traffic. Such places are generally inconvenient for obtaining the necessary hydrogen but that difficulty has to be faced. Similarly the observations of shell-bursts can only be made where special provision for an anti-aircraft gun is available. For these observations the Office must rely very largely upon the co-operation of the military authorities.

It was also noted that a representation had been made to the Treasury on behalf of the Royal Society of Edinburgh, asking for more adequate representation of, and consideration for Scotland in the Meteorological Service. (Minute 762.) In present circumstances it cannot be regarded as satisfactory that London should be the only centre from which a daily weather chart should be issued for the use of the public or for reproduction in newspapers. Some steps should therefore be taken to expand the operations of the Meteorological Office, Edinburgh, so that the local requirements of the Scottisn centres may be better supplied.

The new enterprises which have been mooted and for which provision is necessary are (1) a regularly established service for the Mediterranean at *Malta* dependent upon observations received by cable, or eventually by wireless, from stations in the countries bordering the sea and from the Atlantic Islands, and also upon observations received by wireless from ships on the Mediterranean routes. The proposal for the establishment of such a station has already received the concurrence of the Admiralty, and the Board of Trade.

(2) A station at *Ascension*, which is a Naval establishment on the same footing as a ship of the Navy. The Admiralty has already moved in the direction of establishing meteorological observations there in response to representations from the Meteorological Office of the importance of such observations. The Admiralty have now asked whether the Air Ministry wish to undertake the charge of the meteorological work, and an affirmative reply is suggested.

(3) The meteorological service of the *Cairo to Karachi* route. The necessity for a meteorological service in that route has been fully recognised, and an indication of the requirements was given by Squadron Leader Spiers, at one of the meetings of the Conference of the Meteorologists of the British Dominions. The Royal Air Force on the other hand have notified that their requirements will be satisfied if two junior meteorological officers of the R.A.F. are sent out to Cairo to assist Flight Lieutenant Crichton. It remains to be decided whether that provision is also sufficient for Civil Aviation.

(4) A proposal has been put forward through the Foreign Office by the Norwegian Minister, Mr. Vogt, for a geophysical investigation of the circum-polar regions in connection with Amundsen's polar expedition which has already started and will last four years. (*See* M.O. publication 237, Appendix VI.) The participation of Great Britain in this enterprise was strongly urged by the Norwegian representative at the informal conference of meteorologists in London in July, and the suggestion put forward was that Great Britain

should establish a station for the period, particularly for the summer months of 1920 on the Island of *Jan Mayen*. It has been mentioned that certain huts belonging to the Danish Government, reported to be still in good condition, of which photographs were exhibited, would be placed at the disposal of a British expedition.

The participation of Denmark in the enterprise is practically contingent upon the participation of Great Britain. The enterprise is more geophysical than meteorological although the meteorology of the upper air of the polar regions is certainly of the highest importance for the study of the general circulation of the atmosphere. Hitherto we have not utilised the opportunities afforded by our Islands in the extreme North for the investigation of the upper air, nor for magnetic observations, nor for observations and photographs of aurora. The Shetland Isles are remarkably close to the region of maximum auroral frequency and therefore exceptionally well situated for the study of magnetic storms.

A special expedition to Jan Mayen might therefore be regarded as the preliminary to a permanent observatory in Shetland which with Eskdalemuir and Kew Observatories would give a very good line of stations. The proposal has, therefore, been notified to the Royal Society for consideration by the Gassiot Committee for Geophysical subjects, and also for consideration by the National Geophysical Committee, which has recently been formed under the auspices of the Royal Society, to co-operate with corresponding Committees in other countries forming the International Geophysical Union.

With regard to the last-mentioned proposal the question was raised as to what immediate or eventual practical utility could be urged in justification of the expenditure of public funds. It was understood that the whole question would be raised upon a memorandum setting out the proposal.

The cost of the programme of operations thus sketched out for 1920–21 excluding provision for the last three items had been roughly estimated at £100,000.

It was agreed that a detailed estimate be submitted for consideration at the next meeting.

792. Office Staff.—On the recommendation of the Director in order to facilitate the progress of the organisation the following appointments on the terms of Minute 780 were approved :—

Superintendent (indoor) of the co-ordinated service of forecasts **J. S. Dines, M.A.**, Assistant Superintendent of the Forecast Division of the Meteorological Office. (Minute 754).

Superintendent of the Marine Division with such other duties as the Director may assign. Commander **L. A. Brooke-Smith, R.D., R.N.R.**, Younger Brother of Trinity House, late Commanding Officer of H M.S. " Heroic." (Minute 782.)

Superintendent (*for one year* from his demobilisation on 14th October, 1919) for the organisation and operation of the Malta Service and such other duties as the Director may assign. Squadron Leader **C. P. Hearle**, formerly in charge of R.A.F. Meteorological Service in the Mediterranean.

Director's Orders for Confirmation: postponed until the next meeting.

Obituary.—W. R. Corrin—Caretaker at Kew Observatory died on August 30th. His loss is much regretted. The excellent condition in which the grounds of the Observatory have been kept has been apparent to all who visited the Observatory. Provisional arrangements have been made by which Mrs. Corrin continues to take charge of the Observatory buildings. (Order 911.)

793. Observatories and Stations.—**Contributing stations for the Daily Weather Service.**—Submitted—a map showing the positions of the contributing stations which it was proposed to provide for. It included the provision for observations of the upper air.

At *Aberdeen* the principal observatory on the North Sea coast, by the combination of the work of Longside with that of the Observatory.

Falmouth as a more accessible point than Mullion.

Holyhead by the combination of the station at Llangefny with the telegraphic and anemometric work at Holyhead.

Malin Head by the combination of the work of Lough Foyle (or Londonderry) with the work for the Meteorological Office at Malin Head.

Scilly by the addition of observations of upper air.

Markree Castle or Birr Castle (if Captain Brian Cooper or the Trustees of the Earl of Rosse are willing to co-operate) as a station sufficiently far from the coast to avoid the disturbances of conditions due to the transition.

Castlebay as a point exceptionally well exposed to the Atlantic.

Pembroke by the combination of the Air Station and the Telegraphic Reporting Station.

Jersey by arrangement if possible with the Jesuit Observatory of St. Louis.

It was agreed that the proposals be considered with the estimates.

Proposed Co-operation with Norway in the Circumpolar Investigations 1920–24.—(Minute 771). The question was considered with the preliminary consideration of the programme (Minute 793). In order to bring the question under consideration in the estimates a figure has been assigned for a meteorological and geophysical station at *Shetland* which as regards staff would correspond with what is required for the expedition to Jan Mayen.

794. PUBLICATIONS.—**The Manual of Meteorology** (Minute 745). The resolution of the Meteorological Committee to approve of the action of H.M. Stationery Office in agreeing to take 1,000 copies for the public service at the price of 15*s.* was confirmed.

Proofs of the following publications were laid on the table :—

M.O. 224. Final proof of the **Atlas of Monthly Charts of the Mediterranean** with title page and preface and a note compiled by Major Hearle on change of climate within historic times.

M.O. 232h. **Professional Notes No. 8.** Temperatures and Humidities in the Upper Air, by Captain C. K. M. Douglas, R.A.F.

M.O. 232i. **Professional Notes No. 9.** An Analysis of Cloud Distribution at Aberdeen 1916–18, by G. A. Clarke, Assistant at Aberdeen Observatory.

M.O. 220d. **Geophysical Memoirs No. 14.** Soundings with Pilot Balloons in the Isles of Scilly Nov.-Dec., 1911, by C. J. P. Cave and J. S. Dines, M.A.

Also for approval as a Professional Note MS. of Methods of Calculation for Pilot-Balloon Ascents by J. S. Dines, M.A.

Approved.

Reported—that in accordance with the terms of agreement with the Trustees of the British Rainfall Organization (Minute 781) arrangement has now to be made for the continuation of the series of fifty-eight volumes of British Rainfall as an official publication and also for the combination of the Monthly Circular of the Meteorological Office with Symons' Meteorological Magazine which is now in its fifty-fourth year. Proposals to be put before H. M. Stationery Office for carrying out these undertakings will be submitted to the next meeting.

795. DIRECTOR'S REPORT AND ACCOUNTS :—

Report.—**Conference of Dominion Meteorologists** (Minute 785). The Conference of Dominion Meteorologists convened by the Meteorological Committee in view of the projected Conference of Meteorologists at Paris took place on September 23–27 in the rooms of the Royal Society by the courtesy of the President and Council. The official meteorologists present were : The Director of the Meteorological Office, Acting Controller of the Meteorological Service of the Air Ministry, who presided, Captain A. J. Bamford, Director of the Meteorological Observatory of Colombo, Lieut. Col. D. C. Bates, Director of the Meteorological Service of New Zealand, Lieut. H. D. Grant, Superintendent of the Meteorological Service of the Admiralty, Mr. H. A. Hunt, Director of the Weather Bureau of the Commonwealth of Australia, Mr. H. Knox Shaw, Director of the Meteorological Service (Public Works Ministry), Egypt, Mr. C. Stewart, Chief Meteorologist of the Union of South Africa, Sir Frederick Stupart, F.R.S.C. Director of the Meteorological Service of Canada, Dr. G. T. Walker, C.S.I., F.R.S., Director General of Indian Observatories. Lord Montagu of Beaulieu, Captain Stiles of the Kite-Balloon Testing Station at Kingston, Mr. F. J. Whipple, Superintendent of Statistics, Meteorological Office, expressed the wish to be present at the meeeting. Captain Brunt, Superintendent of Army Meteorological Services, Captain R. B. Mackenzie, Meteorological Service of the Air Ministry, Mr. C. E. P. Brooks, in charge of records from Colonial stations at the Meteorological Office and of the Réseau Mondial, were in attendance.

The Controller General of Civil Aviation was present at the opening meeting and welcomed the representatives.

The subjects submitted for consideration included :—

1. The meteorological arrangements for the exchange of observations by wireless. Specifications of observations for the surface and the upper air with the codes for transmission.

2. The provision of current meteorlogical observations for the main air routes of the world, co-operation in the investigation of the meteorological conditions of aerial navigation.

3. The consideration of instruments and material for the investigation of the upper air.

Some questions by Sir F. Stupart upon the information required by aircraft.

4. The selection of stations of the Réseau Mondial for the purpose of the general climatology of the globe. (M.O publication 207g.)

5. The Trade Routes and the Meteorological Survey of the ocean by observations transmitted by wireless telegraphy from ships.

6. The Study of Hurricanes and Hurricane Conditions (Memorandum by the Hydrographer).

7. The necessity for the publication of tables of past data of monthly temperature, pressure and rainfall over large areas (Dr. Walker).

8. Proposal to secure uniformity of practice in reducing the readings of dry and wet bulbs (Sir Napier Shaw at the suggestion of Mr. Claxton, of Hong Kong, through the Colonial Office).

Colonel Blandy, D.S.O. made a communication upon the arrangement included in the *Convention relating to International Air Navigation* (*CMD 266, 1919*) and a further agreement between the allied powers (not yet published) as to the arrangements for the collection and distribution of meteorological observations by wireless telegraphy.

The representatives present had not previously been acquainted with the terms of the Convention which were unusual in providing international legislation for meteorological services as part of the Treaty of Peace with Germany. Previous attempts to legislate on an international basis for the national meteorological services have always proved abortive because the primary duty of the services is to satisfy national requirements, having regard to the sources from which the money is derived, where international and national requirements have to share the limited funds placed at the disposal of the services by their respective governments, it is found by experience that the former have to give way. International co-operation is, therefore, generally left to the Directors of the Services concerned.

Major Spiers, R.A.F., gave an account of the meteorological organisation which was regarded as desirable for navigation on the great air routes from Egypt to India, Australia, and the Cape. The delegates expressed their willingness to co-operate in their respective spheres of influence and Mr. Hunt gave an interesting account of local wind-conditions in Australia.

The results of the consideration of questions on the programme will appear in the Minutes of the Conference, which will be printed for circulation.

At the close of the Conference, Col. Bates proposed a resolution providing for permanent co-operation between the meteorologists of the Empire and the Director was invited to become President of the Association and to take steps for ensuring its activity.

A brief statement concerning the meteorological service of the several Dominions represented was drawn up by the respective representatives for the use of the Conference, and a statement of the meteorological arrangements in the Crown Colonies and Protectorates was drawn up for the Conference by Mr. Brooks.

In the course of the week the representatives visited the Meteorological Office at an evening reception, Kew Observatory, the Wireless Station at the Air Ministry, the Kite-Balloon Testing Station at Kingston, a standard meteorological hut of the Air Ministry at Bedford, the Meteorological Service of the Admiralty, and the British Rainfall Organization at Camden Square. The Air Ministry arranged for the conveyance of the delegates to the various places at a distance. The Government invited the representatives and other meteorologists to dinner at the Carlton Hotel on Tuesday, September 24.

International Conference in Paris (Minute 785).—The meeting of allied meteorologists in Paris, of which notice was given by M. Lacroix, President of the Comité d'Action, underwent a change of character before it assembled in the rooms of the Ministère de l'Instruction Publique on September 30. It was originally understood to be a meeting of allies, but was extended to include the neutral meteorologists after the meeting of the International Research Union at Brussels in July. The invitations were understood to be issued by the French Government, and M. Angot, Director of the Bureau Central Météorologique, was entrusted with the arrangements.

Representatives of 21 nations were present; the representatives of the United States were unable to obtain the sanction of Congress in time for them to attend, though the President sent a message to Congress for the purpose.

When the Conference assembled, it was found that the military organisations which originally prompted the Assembly had been practically disbanded, and only the practical interests of aerial navigation presented a new feature as compared with previous assemblies.

The Conference, therefore, became practically an ordinary meteorological conference on the old lines instead of being an official congress of Government representatives controlled by Ministries.

On the nomination of M. Angot, Sir Napier Shaw was elected President. The form of constitution of International Meteorological Conferences, Committees, and Commissions drawn up in 1907 was approved with certain minor modifications.

A Committee of 20 members was constituted, of whom 15 members were elected, leaving 5 places to be filled by co-optation. The Director of the Meteorological Office was elected President, M. Angot Vice-President, and Professor van Everdingen, Secretary.

Commissions sat during the meeting for Aerial Navigation, Codes for Meteorological Telegraphy, and Marine Meteorology and reported.

At the close of the meeting Commissions were appointed for :—

Terrestrial Magnetism and Atmospheric Electricity.
(President, M. Angot ; Secretary, M. van Everdingen.)
Polar investigations.
(President, Sir Napier Shaw.)
Agricultural Meteorology.
(President, M. Angot.)
Weather Telegraphy.
(President, Mr. Gold.)
Nautical Meteorology.
(President, M. van Everdingen.)
Solar Radiation.
(President, M. Maurer.)
Application of Meteorology to Aerial Navigation.
(President, M. Sacconey.)
Réseau Mondial.
(President, Sir Napier Shaw.)
Exploration of the Upper Atmosphere.
(President, M. Bjerknes.)

The consideration of co-operation for aerial navigation took the form of inviting the representatives of the several countries to say how far they were prepared to co-operate in a scheme of observation at 1h., 7h., 13h., and 18h. or 19h. The replies were very encouraging, as was also a resolution in favour of the expression of pressure in millibars as the international unit for aerial navigation. The discussion of the International Convention was deprecated by the French representatives because the French version as printed was said to be incorrect.

The proceedings will be published in due course by the French Office and a translation by the Meteorological Office.

By arrangement of the Air Ministry six of the British delegates were accommodated in the Hotel Majestic, and the arrangement for the journey (which took place on the first Sunday of the railway strike) were made by the Air Ministry.

Accounts.—Submitted—the following statement of the Bank Account in the Cash Book :—

	£	s.	d.
Balance on the 29th July, 1919	4,434	11	6
Receipts from 30th July, 1919	9,074	2	7
	13,508	14	1
Cheques drawn from 30th July, 1919	13,254	3	5
Bank Balance on 15th October, 1919	£254	10	8

NINETY-EIGHTH MEETING.

Air Ministry, Kingsway, W.C.2, 5th November, 1919.

PRESENT :

THE PRESIDENT, IN THE CHAIR.
THE DIRECTOR OF THE METEOROLOGICAL OFFICE.

MR. FLOOD.	COLONEL LYONS.
CAPTAIN HARVEY.	MR. MCANALLY.
THE HYDROGRAPHER.	MR. ROSS.
LIEUT.-COLONEL LEWIS.	DR. SCHUSTER.

MR. BERTRAM was in attendance.

796. Reported—that in reply to an invitation of the Air Ministry, in accordance with Minute 788 of the last meeting, the following had been nominated for appointment by the Air Ministry as members of the new Committee :—

By the Colonial Office ... ... Mr. J. E. W. Flood.
By the Board of Trade ... ... Captain J. M. Harvey.
By the Admiralty ... ... Rear-Admiral Learmonth, *Hydrographer to the Navy.*
By the War Office ... ... Lieut.-Colonel Lewis.
By the Board of Agriculture ... Sir Thomas Middleton, K.B.E.
By appointment of the Air Ministry { Mr. McAnally (*Secretariat*). Mr. Ross (*Finance Department*).

Colonel Lyons and Dr. Schuster continued to represent the Royal Society provisionally.

The representation of the Treasury was replaced by the appointment of a Finance member of the Air Ministry in place of Mr. Barstow.

The President reported the receipt of a letter (B. 11304· enc. 21/4) from the Secretary for Scotland asking that Scotland should be represented on the Committee; and enclosing also a letter from the President of the Royal Society of Edinburgh urging the necessity for the expansion of the meteorological work in Scotland. (Minute 791.)

It was agreed to put forward a recommendation to the Air Council that the Royal Society of Edinburgh should be invited to nominate a member of the Committee, and to take up the consideration of the expansion of the work in Scotland when opportunity of consulting the representative was provided.

Arising out of Minute 791 of the last meeting, the Director asked for permission to revise the list of new enterprises there suggested by adding the measurement of wind velocity by shell bursts from anti-aircraft guns.

Approved.

The Minutes 788–795 of the last meeting, previously circulated, were taken as read, and, with certain modifications, confirmed. It was further agreed that the title of the Office should should be Meteorological Office, the address should be Meteorological Office, Air Ministry, Kingsway, and that publications should carry the heading "Air Ministry."

797. STATE METEOROLOGICAL SERVICE (Minute 790).—**Arrangements by the Air Ministry.**—Read—the following letter from the Treasury following on an interview with Mr. Barstow by the Director and Mr. Ross on 17th October :—

31348–19.

Treasury Chambers,
4th November, 1919.

SIR,

THE Lords Commissioners of His Majesty's Treasury have had before them Mr. McAnally's letter of the 16th July last (A. 18550–C. G. C. A.) further respecting the transfer to the Air Ministry of the Meteorological Office.

My Lords are of opinion that in the Votes for the Air Ministry, shortly to be laid before Parliament, provision should be taken for an inclusive sum as Grant to the Meteorological Office in supplementation of the Grant in Class 4 Vote 8 Sub-head B of £47.000. In order that a proper discharge may be given for the grant of £47,000 from the Scientific Investigation Vote 1919–20 it would be necessary for Their Lordships to receive a certificate that expenditure to that amount had been duly passed by the accounting officer of the Air Ministry (acting on Their behalf). The balance of the expenditure of the Meteorological Office would then represent the charge against the Air Ministry Vote 1919–20.

In 1920–21 and succeeding years the Class 4 provision would not be made and the extra expenditure of the Meteorological Office would be provided on Air Ministry Votes and accounted for as a charge against those Votes.

My Lords agree that as from the date of the transfer the Meteorological Committee, appointed under Treasury Minute, should be wound up and a new Meteorological Committee under the Air Ministry constituted in the manner provided in the report of Mr. H. A. L. Fisher's Committee which was approved by the Cabinet Committee on Home affairs. They understand that it is proposed that the Controller General of Civil Aviation shall be President of the Committee, and the existing Director of the Meteorological Office shall be Chairman and paid at the rate of £1,500 a year, inclusive of war bonus and fees.

My Lords approve of these proposals.

I am, &c.,
G. L. BARSTOW.

he Secretary,
Air Ministry

It was agreed that the Director and Mr. Ross should meet and consider the various points raised in the letter and put forward proposals at the next meeting.

Correspondence with H.M. Stationery Office.—Reported—the receipt of a letter (M.O. 13440) from the Deputy-Controller of H.M. Stationery Office stating that in the opinion of the Controller the removal of the lithographic plant to Canada House was not essential, and asking that representation should be made to the Treasury if its removal were still desired.

Mr. McAnally undertook to press the matter from the point of view of the Ministry.

Report of the Meteorological Service of the Air Ministry.—Submitted—a report of work of the Meteorological Section for the period April–September, 1919 (M.O. 13515), previously circulated.

798. TERMINATION OF APPOINTMENT OF DIRECTOR AND COMMITTEE.—The Director reported that the period of appointment of the Director of the Meteorological Office under Treasury letter 4683/15 and 6672/15 and of the Meteorological Committee under Treasury minute of 31st March, 1915, terminated on 31st March next.

799. British Rainfall Organization (Minute 781).—**Proposal for Advisory Committee.**—The Director reported that it was desirable to form a small Consultative Committee to advise on the subject of rainfall, and suggested that such a Committee be formed principally from among the former trustees of the British Rainfall Organization.

Approved.

British Rainfall. Volume 59.—*Circulars inviting observations and subscriptions to be liquidated by publications.*—Submitted—a draft circular which it was proposed to circulate as in previous years to observers and subscribers. The following new paragraph necessitated by the transfer of the Organization to the Meteorological Office was read :—

> " The cost of preparation and publication of British Rainfall has hitherto been provided in part by the subscriptions of those interested in the study of rainfall and the annual income of the endowment fund of the Organization, to which donations were made from time to time. The Agreement with the Government makes no provision for transferring the Endowment Fund : that has been retained by the Trustees and is still in their charge. Observers and annual subscribers to the current expenses of British Rainfall have been entitled to receive certain publications of the Organiza ion on specially favourable terms. The same arrangement may still be found acceptable.
>
> " It has therefore been arranged with H. M. Stationery Office that observers and subscribers may have as heretofore the privileges indicated on the back of this sheet."*

Approved.

Upon the question of the probable decline in the number of voluntary observers emphasis was laid on the necessity for regarding the municipal authorities rather than the Central Office as responsible for the supply of observations necessary for the adequate representation of the rainfall of the districts under their charge.

Symons's Meteorological Magazine. Volume 55.—It was agreed that Symons's Meteorological Magazine, previously published by the British Rainfall Organization, should be incorporated with the Monthly Circular of the Meteorological Office under the title of the Meteorological Magazine, as from February next.

Proposals put forward by the Superintendent of British Rainfall and the Superintendent of Statistics, previously circulated (M.O. 12289), for the co-ordination of the work on rainfall were also approved.

Metropolitan Water Board (Minute 781).—Reported—that the Metropolitan Water Board were anxious for the work to be continued on the same lines and under the same conditions as set out in the agreement with Dr. Mill (Minute 781), but that they were not prepared to make any payment by way of consideration to a Government establishment for services which it might render, though they were willing to make an agreement and pay the customary consideration to Mr. Salter.

It was agreed that the question of the payment for information supplied required further discussion before any definite arrangement could be made, but that in the meantime Mr. Salter should continue the work for the Board on the understanding that fees received by him should be paid into the general fund.

Mr. McAnally undertook to look into the question of the payment of fees for services rendered to public institutions of the nature of the Metropolitan Water Board.

Rainfall of Scotland.—Reported—that the rainfall data for a large number of stations and lighthouses in Scotland are at present collected by the Scottish Meteorological Society, and tables of monthly values for all the stations are printed in the Journal of the Society. Meanwhile the British Rainfall Organization makes an independent collection of data from Scotland as part of the work upon the rainfall of the British Isles. The stations are for the most part identical with those of the Scottish Society, but not entirely so. Tables of annual values are accordingly included in British Rainfall, but only a small selection of the monthly values.

It is proposed to arrange for co-operation in the work on the rainfall of Scotland by providing that the Meteorological Office, Edinburgh, which already receives a subvention of £350 a-year, with additions on account of war bonus, about £500 in all, from the grant for the Meteorological Office, and £100 from the Treasury on account of the Registrar-General for Scotland, for the collection and compilation of data from climatological stations in Scotland, shall also undertake as part of its duty the collection of

* The privileges consisted of the offer of a free copy of the general table from the current issue of British Rainfall, and of British Rainfall and the Meteorological Magazine at a reduced price to be fixed after consultation with H.M. Stationery Office. An order form for publications of the Office is to be attached to the circular.

rainfall data for Scotland hitherto conducted by the staff of the Edinburgh Office for the Scottish Meteorological Society, under the arrangement of Minute 393. Copies of the schedules compiled in accordance with this arrangement will be contributed as may be required to the office in order to complete the files of the Rainfall Organization.

It is further proposed that copies of tables of rainfall for Scotland printed as part of the rainfall statistics of the British Isles shall be supplied on repayment to the Scottish Meteorological Society for distribution to the members of the Society in place of the tables which are now printed independently by the Society for its Journal.

Approved.

Transfer of the Assets of the Organization.—Reported—the receipt of Treasury letter 32549/19 (M.O. 10106), authorising a provisional advance of £5,584 6*s*. out of the grant-in-aid to meet the costs of transfer of the British Rainfall Organization, under clauses 12 and 15 of the Agreement.

Reported—a note on the collection of Monthly Rainfall Totals, and Rainfall Maps at the British Rainfall Organization, and also a schedule of the principal items of property (M.O. 11027).

*Note on the Collection of Monthly Rainfall Totals at the British Rainfall Organization, 62, Camden Square, N.W.*1.—This collection of monthly rainfall totals is intended to include all the rainfall data existing in the British Isles. The figures are on foolscap sheets, each sheet containing the data for ten years for one or more stations. The sheets for each decade are put together in sets corresponding to counties in the order in which they are published in British Rainfall ; these sets are then placed in spring-back covers, of which there are 213. In the covers there has been an attempt at a colour scheme, black for England, yellow for Wales, red for Scotland and green for Ireland, but this has not been rigidly adhered to.

The bulk of the covers are kept in a fire-proof safe, which is now full ; those for the decade 1850–59 (8 covers) are in another safe. The whole forms a unique body of data.

Note on the Collection of Rainfall Maps at the British Rainfall Organization.—This collection of maps, which now covers about three-quarters of the British Isles, is based on the half-inch contour maps (Ireland, quarter-inch). All available averages are plotted, and the isohyets are inserted, allowance being made for the relief of the land where data are scanty.

Another set of maps gives a representation of the rainfall of each year for the 50-year period (1865–1914). These maps are divided into 5-mile squares, and the amount for each square read off from the isohyets is entered in it. It is intended to find the 50-year average for each square and draw an average map on this basis, but the work is not yet complete.

In addition to this are a large number of special maps showing the distribution of rainfall on special days or in special storms.

Schedule of principal items of property inspected at the Office of the British Rainfall Organization on 28th July, 1919, in connection with the transfer of administration to the Meteorological Committee.

——	Notes.	Position.
Instruments :—		
Electrical rainfall recorder, connected with gauge in garden.	Out of order	2
Halliwell recording raingauge		1
Casella standard raingauge	Worn out	1
2 8-inch raingauges		1
1 5-inch „		1
2 Symons's „	Old	1
1 5-inch „ (Snowdon)		1
Evaporation tank and small hand anemometer		1
Glaisher screen, containing dry, wet, max., min., and "turnover" thermometers.		1
Stevenson screen, containing 2 thermometers (max. and min.).		1
2 solar max. thermometers		1
Wilson radio integrator		1
3 earth thermometers		1
2 grass minimum thermometers		1
Campbell-Stokes sunshine recorder		5
Wind vane on mast		1
Small stock of spare thermometers		5
Redier barograph	Out of order	2
Fortin barometer		2
Kew „	Spare	4
„ „	Old spare	3

1 = Garden. 2 = Library. 3 = Office. 4 = Map room. 5 = Out-house. 6 = Store room. 7 = Dr. Mills' room.

—	Notes.	Position.
Records:—		
Daily and monthly records of rainfall	In lockers and iron safe ...	5
Documents relating to professional and legal inquiries	About 300 parcels	5
Fire-proof safe containing 213 spring-back folios of monthly rainfall records, 1850 to date.	Built in wall. (8 folios in separate safe, contain records prior to 1850).	3
Ordnance Survey maps	Large collection	4
Stock of maps used for drafts for reproduction		4
Original draft monthly rainfall maps from 1900... ...	Some earlier	4
Daily rainfall maps for days of special interest, heavy falls, storms, etc.		4
Ordnance Survey map showing stations and river basins	Scale ½-inch to a mile ...	4
Annual rainfall maps for the British Isles for each year 1865–1914 (incomplete).	Beginning of rainfall atlas...	4
Average annual rainfall maps (originals) for various districts covering about ¾ of the British Isles.	Large scale, mostly ½-inch to a mile: would form basis of rainfall survey.	4
Camden Square daily meteorological observation books	1857 to date	4
Camden Square daily rain curves	1881 to date	4
Schedules of hourly duration and amount of rainfall at Camden Square.	1881–1918	4
Library and Publications:		
Approximately 200 feet run of books on shelves, principally on the subjects of rainfall and general meteorology.	These include some of the private property of Dr. Mill and Mr. Salter.	2
Books of general reference	Revolving bookcase... ...	2
Observers' record books (county books)	Form index to records ...	2
"British Rainfall" and "Symons's Meteorological Magazine."	Stock of copies from 1860 to date.	6
Copies of everything published by British Rainfall Organization.	Stock of copies from 1860 to date.	6
Recent presentations to library	Unsorted and unbound ...	6
Zinc blocks, etc.	Used for illustrations and diagrams.	6
Correspondence and General Office Fittings:		
Correspondence from 1905	Imperfectly filed, probably none earlier.	2
Outward letter-books from about 1903	Press copies	2
" " " current		3
1 Stolzenberg roll shutter cabinet of current correspondence.	About 3 ft. high	2
Stock of stationery, printed forms, etc.		3
1 Salter typewriter	Fair order, but requires adjusting.	3
1 Maskelyne typewriter	Old and worn-out.	6
1 copying press		3
Documents relating to current professional inquiries ...	In special lockers	2
3 chart cabinets, one with drawing slope	Approx. 4 ft. × 3 ft. × 3 ft.	4
Roll-top writing desk	Light polished oak	7
Cupboard under bookcases	Light fumed oak. Available for purchase, Maple's offer £25.	7

(Signed) H. LESTER B. TARRANT.
28th August, 1919.

Tenancy Agreement and Notification of Hiring.—Reported—the receipt from the Office of Works of the Tenancy Agreement (M.O. 11847) of 8th August, 1919, and also the Notification of Hiring (M.O. 13302) in respect of 62, Camden Square.

Owing to the necessity for economy emphasis was laid on the desirability of releasing as soon as possible the premises at 62, Camden Square, and housing the work of the British Rainfall Organization in the Meteorological Office at South Kensington. The Director explained that for the time being all the space made available by the transfer of the Headquarters Administration, the Forecast Division and the Marine Division to Kingsway would be taken up by the surrender of the three rooms on the top floor, borrowed from the Science Museum and by the surrender of 15, Cromwell Road, which is occupied by the Instruments Division.

800. PROGRAMME AND ESTIMATES.—Submitted—the following statement of salaries required for the staff of establishments which have been demanded and a preliminary

draft of the estimates for the year 1920–21, and a detailed schedule of "salaries" of staff for the full requirement of the programme. The Director indicated the curtailment of the establishments by which the total of proposed salaries could be reduced from £110,000 to £82,000 as set out in the preliminary estimates.

METEOROLOGICAL OFFICE.—SALARY LIST.

The sums given in this table are those required for salaries according to proposals which have been put forward for the various branches of the service; the various items have now to be considered from the point of view of the priority of the various needs and the adjustment of the interests of the several branches.

War bonuses computed as follows:—

	£	
Men	60	with 20 per cent. of normal salary.
Women	40	
Boy Clerks	50	
„ Probationers	50	
Messengers	30	

Salaries for Vacancies computed as follows:—

Senior Professional Assistant	375
Junior Professional Assistant	250
Principal Assistant	225 + 45 + 60 = 330
Staff Assistant	175 + 35 + 60 = 270
Technical Assistant	75 + 15 + 60 = 150
Boy Clerk	45 + 10 + 50 = 105 (Approximate.)

No. of Staff employed.	To be added.	—	Present.	Estimated Increase.	Total.
			£	£	£
1		Director	1,240	—	1,240
4		§Director's personal staff	1,414	—	1,414
		Administration and Accounts.			
21 (2)		At present employed	4,477	—	4,627
	1	Vacancies—1 Computer	—	150	
		2 Principal Assistants retire.			
		Marine.			
9 (4)		At present employed	3,277	—	3,277
		Acting Superintendent replaced by—			
		1 Senior Professional Assistant.			
		1 Clerk Assistant.			
		1 Principal Assistant and 1 Staff Assistant retire.			
		Forecasting.—Distributive Centres.			
1		Assistant Director	850	—	850
		A. *Army Services.*			
1		Superintendent	650	—	5,932
		Shoeburyness—			
11		At present employed	2,116	—	
	3	Vacancies—3 Technical Assistants	—	450	
		§*Lavington*—			
5		At present employed	1,146	—	
	5	Vacancies { 1 Staff Assistant; 4 Technical Assistants	—	870	
		†*Porton*—			
	4	Vacancies { 1 Junior Professional Assistant; 3 Technical Assistants	—	700	
		B. *Head Quarters.*			
31		At present employed	7,617	—	13,546
—	23	Vacancies { 3 Assistant Superintendents; 2 Junior Professional Assistants; 3 Staff Clerks; 3 Clerk Computers; 9 Boy Clerks; 1 Storekeeper; 2 Messengers	—	4,429	
		Add for night duty	1,000	500	

† = omitted. § = modified.

No. of Staff employed.	To be added.	—	Present.	Estimated Increase.	Total.
		S.E. England.			
		§*Air Ministry*—			
—	10	Vacancies { 1 Superintendent ... ... ; 1 Assistant Superintendent ... ... ; 1 Senior Professional Assistant ... ; 1 Junior Professional Assistant ... ; 1 Staff Assistant ... ... ; 5 Technical Assistants ... ... }	—	2,795	
		*C 1. *Hounslow*—			
—	5	Vacancies { 1 Senior Professional Assistant ... ; 1 Staff Assistant ... ... ; 3 Technical Assistants ... ... }	—	1,095	7,175
—	5	C 2. *Lympne* ... }	—	1,095	
—	5	M 4. *Felixstowe* } As for Hounslow ...	—	1,095	
—	5	M 6. *Grain* ... }	—	1,095	
		S. England.			
		*M 1. *Andover*—			
—	9	Vacancies { 1 Assistant Superintendent ... ... ; 1 Senior Professional Assistant ... ; 1 Junior Professional Assistant ... ; 1 Staff Assistant ... ... ; 5 Technical Assistants ... ... }	—	2,145	
—	5	M 2. *Calshot.* As for Hounslow	—	1,095	5,680
—	6	†C 7. *Filton.* As for Hounslow, plus 1 Junior Professional Assistant.	—	1,345	
—	5	†M 12. *Portland.* As for Hounslow	—	1,095	
		N.E. England.			
		M 3. *Howden*—			
—	7	Vacancies { 1 Assistant Superintendent ... ... ; 1 Junior Professional Assistant ... ; 1 Staff Assistant ... ... ; 4 Technical Assistants ... ... }	—	1,620	2,715
—	5	†C 4. *Newcastle.* As for Hounslow.	—	1,095	
		E. England.			
		M 7. *Cranwell*—			
—	8	Vacancies { 1 Assistant Superintendent ... ... ; 1 Junior Professional Assistant ... ; 1 Staff Assistant ... ... ; 5 Technical Assistants ... ... }	—	1,770	2,865
—	5	†M 9. *Bircham Newton.* As for Hounslow ...	—	1,095	
		Midlands.			
		†C 6. *Castle Bromwich*—			
—	7	Vacancies { 1 Assistant Superintendent ... ... ; 1 Staff Assistant ... ... ; 5 Technical Assistants ... ... }	—	1,520	1,520
		Lancashire.			
		C 3. *Didsbury*—			
—	9	Vacancies { 1 Assistant Superintendent ... ... ; 1 Senior Professional Assistant ... ; 1 Junior Professional Assistant ... ; 1 Staff Assistant ... ... ; 5 Technical Assistants ... ... }	—	2,145	2,145
		S.W. England.			
—	8	M 5. *Cattewater.* As for Cranwell	—	1,770	1,770
		Ireland.			
—	8	*Baldonnel.* As for Cranwell	—	1,770	2,865
—	5	†*Aldergrove.* As for Hounslow	—	1,095	

* The sign before the name of the station indicates the order of priority agreed upon by the Air Ministry. C indicates Civil Priority, M Military.

No. of Staff employed.	To be added.	—	Present.	Estimated Increase.	Total.
		Scotland.			
		Edinburgh—			
—	5	Vacancies { 1 Superintendent ... ... 1 Senior Professional Assistant ... 1 Junior Professional Assistant ... 1 Staff Assistant ... ... 1 Technical Assistant ... ... }	—	1,695	
—	8	†M 10. *Donibristle.* As for Cranwell	—	1,770	
—	5	†M 13. *Dundee.* As for Hounslow	—	1,095	7,550
—	5	†M 11. C 5. *Renfrew.* As for Hounslow	—	1,095	
		M 8. *Orkney.*			
—	8	Vacancies { †1 Assistant Superintendent ... 1 Senior Professional Assistant ... 1 Staff Assistant ... ... §5 Technical Assistants ... ... }	—	1,895	
		Port Officers.			
—	5	Vacancies { §3 Senior Professional Assistants ... 2 Technical Assistants ... ... }	—	1,425	1,425
		Climatology and Statistics. Library, Observatories and Other Contributive Stations.			
3	—	3 Assistant Directors	2,170	—	
26 (1)	—	At present employed	6,102	—	10,147
—	4	Vacancies { §3 Assistant Superintendents ... ... 1 Senior Professional Assistant ... }	—	1,875	
		1 Principal Assistant retires.			
		Instruments.			
14 (1)	—	At present employed	3,499	—	
—	1	Vacancies { 1 Junior Professional Assistant ... 1 Principal Assistant retires ... ... 1 Staff Assistant to be Principal Assistant. }	—	300	3,799
		Rainfall Division.			
5	—	At present employed	1,400	—	
—	6	§Vacancies { 1 Senior Professional Assistant ... 1 Principal Assistant ... ... 2 Computers ... ... 2 Boy Clerks ... ... }	—	1,215	2,615
		Atmospheric Pollution.			
2	—	At present employed	480	—	480
		Kew Observatory—			
14*	—	At present employed	2,284	—	
—	3	§Vacancies { 1 Senior Professional Assistant ... 1 Principal Assistant ... ... 1 Staff Assistant... ... ... }	—	975	3,259
		Eskdalemuir.			
9	—	At present employed	1,785	—	
—	5	§Vacancies { 1 Senior Professional Assistant ... 1 Principal Assistant ... ... 2 Staff Assistants ... ... 1 Technical Assistant ... ... }	—	1,395	3,180
		Valencia.			
7	—	At present employed	1,351	—	
—	4	§Vacancies—4 Technical Assistants	—	640	1,991
		1 Senior Professional Assistant to be Assistant Superintendent.			
		South Farnborough.			
4	—	At present employed	921	—	
—	4	Vacancies { 1 Assistant Superintendent ... ... 2 Technical Assistants ... ... 1 Boy Clerk ... ... }	—	905	1,826
		Benson.			
3	—	At present employed	894	—	
—	3	Vacancies { 1 Clerk Assistant ... ... 2 Boy Clerks ... ... }	—	410	1,304
		Aberdeen.			
2	—	At present employed	170	—	
—	5	Vacancies { 1 Assistant Superintendent ... ... 4 Technical Assistants ... ... }	—	1,100	1,270

* One on three years special leave. No salary allowed.

No. of Staff employed.	To be added.	—	Present.	Estimated Increase.	Total.
		Falmouth.			
2	—	At present employed	331	—	
—	4	§Vacancies { 1 Senior Professional Assistant ... 1 Junior Professional Assistant ... 2 Probationers	—	835	1,166
		Holyhead.			
—	4	Vacancies { 1 Senior Professional Assistant ... 1 Staff Assistant ... ... 2 Probationers	—	855	855
		†*Malin Head.*			
—	6	Vacancies { 1 Senior Professional Assistant ... 1 Junior Professional Assistant ... 1 Staff Assistant... ... ... 1 Clerk Assistant ... ... 2 Probationers	—	1,315	1,315
—	4	*Scilly.* As for Holyhead	—	855	855
—	9	§*Lerwick.*			
		Vacancies { 1 Superintendent ... ... 1 Senior Professional Assistant ... 1 Junior Professional Assistant ... 1 Principal Assistant ... ... 1 Staff Assistant... ... ... 2 Technical Assistants ... ... 2 Probationers	—	2,385	2,385
—	4	†*Mackree Castle.* As for Holyhead	—	855	855
—	4	†*Castlebay.* As for Holyhead	—	855	855
—	4	†*Pembroke.* As for Holyhead	—	855	855
—	4	†*Jersey.* As for Holyhead	—	855	855
—	1	*St. Helena.* 1 Technical Assistant	—	150	150
—	4	†*Ascension.*			
		Vacancies { 1 Assistant Superintendent ... ... 1 Staff Assistant... ... ... 2 Probationers	—	980	980
—	11	*Malta.*			
		Vacancies { 1 Superintendent ... ... 3 Senior Professional Assistants ... 2 Junior Professional Assistants ... 2 Staff Assistants ... ... 3 Technical Assistants	—	3,265	3,265
175(8)	283		45,174	65,684	110,858

Estimates for the Year 1920–21.

Preliminary Draft.

	£	£
Salaries.		
Director, Administration and Accounts	6,467	
Marine	3,227	
Army Services. ? add 1,000	4,932	
Forecasting and Distributive Centres	35,676	
Observatories and Contributive Stations	32,462	
		82,764
Other Expenses.		
Expenses of Office		1,500
Post Office :—		
Postage	1,500	
Telephones	200	
Telegrams	5,000	
		6,700
Stationery Office		120
Travelling Expenses	1,000	1,000
		9,320

ESTIMATES FOR THE YEAR 1920–21—*continued.*

	£	£
Brought forward		9,320
Superannuation :—		
Annuites	562	
Pensions not chargeable	10	
Pensions chargeable	1,500	
Contribution to Fund		2,072
Cost of Instruments		2,000
Expenses of M. O. Observatories		2,000
Expenses of Auxiliary Observatories :—		
Subventions	345	
Telegraphic	1,000	
Incidental—Land, Ships...	500	
		1,845
Atmospheric Pollution		300
British Rainfall		300
Edinburgh Office		500
		18,337
Appropriations-in-aid :—		
Royal Society	1,400	
Expenses Refunded	1,785	
Inspections	300	
Superannuation	604	
		4,089
		£14,248

Assuming communications from and to aerodromes are by Air Ministry service.

It was agreed that a **Sub-Committee on Finance** be formed, and the following names were suggested : The Director, Mr. Ross, Mr. Bertram, Colonel Lyons.

Approved.

Programme of Publications—Submitted—the following for the year 1920 :—

Periodical:

Daily Weather Report (1920), British Section (800), International Section (300), Upper Air Supplement (800).

Monthly Meteorological Charts of the Atlantic Ocean (1920) (450 + 125).

Monthly Meteorological Charts of the East Indian Seas (1920) (150 + 100).

Monthly Meteorological Charts of the Mediterranean Basin (100).

British Meteorological and Magnetic Year Book :

Part I.—Weekly Weather Report (1920) (375 + 75 + 170). (The daily weather maps have not been printed since August, 1914. Each map when it appears should occupy a full 4to page.) Appendices I. and II., as before.

Part II.—Monthly Weather Report (1920). Each monthly issue increased by two pages of letterpress. Monthly Summaries (600 + 100 + 650 for Royal Meteorological Society + 150 for Scottish Meteorological Society + 10 each of two plates).

Annual Summary, including wind summary for the year (700 + 100 + 650 for Royal Meteorological Society + 150 for Scottish Meteorological Society + 10 each of two plates).

Part III., Section 1.—Daily Readings at Stations of the First and Second Orders, with Annual Review (1920) (250).

Section 2.—Geophysical Journal, with Annual Review of the Investigation of the Upper Air (1919) (400).

Part IV.—Hourly Values from Autographic Records (1918) (400).

Part V.—Réseau Mondial (1914 and 1915) (500).

Meteorological Magazine. Symons's Meteorological Magazine incorporated with M. O. Circular.

British Rainfall, 1919.

Observer's Handbook, 1920 edition (100 + 525).

Summary of Maritime Weather Signals at present in use in the various countries of the globe (1918 edition) (125).

Calendar, with Notes and Diary for the use of observers, for 1921 (550).

Programme of Publications for 1920–21—*continued.*

Occasional:

Manual of Meteorology. (Royal 8vo.)
Geophysical Memoirs (Further Numbers) (500 + 100).
Professional Notes (Further Numbers) (500 + 100).
Computer's Handbook. (Royal 8vo.) (500) Revision.
Tabulator's Handbook. (Royal 8vo.)
The Book of Normals of Meteorological Elements of the British Isles. (Royal 8vo.) (500 + 1,000 ?) Further Sections.
Twelve Monthly Charts of the South Atlantic Ocean (M.O. Press).
Atlas of Tropical Hurricanes (500 + ?).
Memoir on the Distribution of Ice.
Climatological Atlas of the British Isles.
Monthly Charts of Mean Temperature of the Atlantic South of Latitude 50° N., in co-operation with the Danish Institute.
*Meteorological Observations in the British Crown Colonies, 1910–1919.

Approved.

801. Office Staff.—**War Bonus under Award No. 84.** (Minute 765.)—Reported—the receipt of Treasury letter 35143/19 (M.O. 12552) with regard to the payment of War Bonus on the Civil Service scale under Award No. 84 to members of the staff of the Meteorological Office. The Director proposed that he should call at the Treasury to go into the matter of the exceptions raised in the letter under reference.

Approved.

Superannuation (Minute 782).—Reported—the receipt of the following Treasury letter :—

Ref. 35815/19.—M.O. 12888.

Treasury Chambers,
15th October, 1919.

Sir,

In reply to your letter of the 15th ultimo (10137) relative to the Superannuation Regulations of your Office, I am directed by the Lords Commissioners of His Majesty's Treasury to say that they do not consider it desirable that the pensions of any members of the staff who retired before the war should now be increased.

Numerous cases have occurred in the Civil Service of pensioners who returned to the Service in a purely temporary capacity, and My Lords have not felt able to increase their pensions in respect of this service. They cannot, therefore, approve the grant of an increased pension to Messrs. Harding and Curtis, particularly seeing that their recent service has not been whole-time.

It is the general practice in the Civil Service to refuse to grant any additional pension in respect of acting rank, but having regard to the additional grant made to R. H. Curtis, My Lords will offer no objection to the proposed addition of *ten pounds* to the Superannuation allowance of Mr. H. Harries.

My Lords agree that it is desirable to increase the limit of three hundred pounds on which the maximum pension is at present based but they do not consider that it should be raised beyond *three hundred and seventy-five pounds*, seventy-five pounds being the amount of war bonus which may at present be included in the calculation of pension in the Civil Service where the substantive salary is three hundred pounds.

The maximum pension will, therefore, be *one hundred and eighty-seven pounds ten shillings.* My Lords agree that the retiring allowances of the persons now to be superannuated should come under their rule, and they have no objection to the continuance of full pay in these cases until the 31st December next.

As regards the war bonus paid to Messrs. Curtis and Harding, I am to refer to Their Lordships' letter of 7th instant (35143/19).

I am &c.,
M. G. Ramsay.

The Director,
Meteorological Office.

Demobilisation.—Reported the demobilisation of the following members of the office staff: **A. G. Goad** (Minute 574), on 9th September, 1919, Store-keeper ; **C. S. Herbert** (Minute 623), on 30th August, 1919.

Reported also—that the following members of the staff had recently returned to England from service abroad and were awaiting demobilisation :—

From service on the Rhine—

Major A. H. R. Goldie.
Capt. F. Entwistle.
Capt. H. W. L. Absalom.
Lieut. G. R. Hay.
Sergt.-Major E. L. Clinch.
Sergt. C. F. J. Jestico.

From service in North Russia—

Capt. W. H. Pick.
Lieut. M. A. Giblett.
Spr. W. J. Fowler.
Sergt.-Major R. M. Poulter.

* Added on the authority of Minute 808.

Reported also—that Capt. J. Durward, Lieut. R. P. Batty, and Sergt. C, V. Ockenden at present working on Artillery Ranges were awaiting immediate demobilisation.

Resignations.—Reported—that the resignation of **Mrs. Stocks,** (Minute 667), Supernumerary Clerk in the Secretarial Division had been accepted as from 20th August, 1919.

Reported also—that the resignation of **Miss E. Cottrill,** (Minute 695), Telephonist, had been accepted as from 21st October, 1919.

Termination of Appointment: Reported—that the appointments of **C. S. Dunbar** and **T. C. Rogers,** (Minute 782) had been terminated at the end of their period of 3 months probation of training as technical assistants.

Orders for Confirmation.—Reported—the following Director's Orders for confirmation :—

Appointments.—Order 880 appointing **William Theodore Grieves** Clerk Assistant in the Marine Division at a salary of £127 10*s.* with normal war bonus. The appointment to date from 25th August, 1919, and to be subject to three months' notice on either side.

Order 881 appointing **Charles Henry Kellett** (Minute 765) Resident Observer at Kew Observatory from 26th August, 1919, under the conditions specified in Minute 421.

Order 883 appointing **Harold William Mizen** as Probationer, at a salary of 17*s.* 6*d.* per week with normal war bonus. The appointment to date from 1st September, 1919.

Order 912 appointing **Mrs. Jean Murray** Housekeeper at Eskdalemuir Observatory, at a salary of £65 with normal war bonus. The appointment to date from 18th October, 1919, and to be subject to three months' notice on either side.

Order 922 appointing **Miss D. K. Lamport** Temporary Assistant at British Rainfall Organization, at an inclusive salary of £2 per week. The appointment to date from 27th October, 1919.

Voluntary Assistant.—Order 897 granting permission to **Major C. H. Ley, R.E.,** to work as a volunteer at British Rainfall Organization from 30th September, 1919.

Promotions.—Order 873 promoting **Thomas Howard Applegate** (Minute 765) from Probationer to Technical Assistant, at a salary of £75 per annum with normal war bonus. The promotion to date from 1st August, 1919, and to be subject to three months' notice on either side.

Order 909 promoting **Edward Stanley Wood** (Minute 765) from Probationer to Technical Assistant, at a salary of £75 per annum with normal war bonus. The promotion to date from 1st August, 1919, and to be subject to three months' notice on either side.

Order 910 promoting **Miss Grace Kathleen Herbert** (Minutes 623 and 754) from Clerk Computer to Clerk Assistant. The promotion to date from 1st October, 1919.

Order 913 promoting **William Kimber** (Minute 715) from Boy Clerk to Probationer, at a salary of 19*s.* per week with normal war bonus. The promotion to date from 13th October, 1919.

Approved.

New Appointments.—Authority was given for the following appointments: Major **A. H. R. Goldie** (Minute 754), formerly Commandant, Meteorological Section R.E. British Army of the Rhine, to be Superintendent (outdoor) Forecast Division for distributive stations in England, Wales and Ireland.

Capt. **F. Entwistle,** Senior Professional Assistant (Minute 754), formerly Meteorologist-in-Charge at Wimereux, to be attached to the Forecast Division for the distributive stations in S.E. England.

Demobilisation of R.A.F. Officers.—Submitted—the following memorandum on the appointment on demobilisation of officers of the meteorological sections of the Royal Air Force and of the Royal Engineers.

Appointment of Officers on Demobilisation.—Meteorological Officers of the R.A.F. or Meteorological Section, R.E., who have qualified for professional appointments may continue in, or rejoin, the Meteorological Service on the following terms :—

Officers under 25 years of age.—Junior Professional Assistants at £250 a year (inclusive of war bonus), with seniority to count from the date of the first commission as a Meteorological Officer in the R.A.F., R.N.A.S., or R.E., and £25 added for each completed year of service.

Officers 25 years of age or over.—Senior Professional Assistants at £375 a year (inclusive of war bonus), with seniority of the assistant to count from the 1st April next following his 25th birthday if his commission dates back before then, or from the date of his first commission as a Meteorological Officer if he was already 25 years of age at the time of his commission, and £15 added for each completed year of service.

In computing the years of service, the year ends with 31st March and service for more than six months before that date counts as a full year, and for less than six months does not count.

A number of appointments as Assistant Superintendents at £500–£600 a year to take charge of certain stations are open to the professional assistants appointed under this order.

The salaries of these appointments and the conditions of pensions, etc., will be defined upon the result of a Committee appointed by H.M. Treasury to consider the salaries of scientific staff in the Civil Service.

In the meantime the appointments are subject to three months' notice.

The normal qualifications for a professional appointment (Senior Professional Assistant and Junior Professional Assistant) in the Meteorological Service is a degree with first class honours in Mathematics or Physics.

The course for Naval Officers at Dartmouth or for Military Officers at Sandhurst or Woolwich would be accepted as an alternative. In the present instance the degree of B.A. or M.A. at Oxford, Cambridge or Dublin, or M.A., M.Sc., or B.Sc. at other Universities, will be accepted *prima facie* as a qualification.

The officers whose appointments come under this minute and other recent minutes of the Meteorological Committee are :—

Capt. H. W. L. Absalom, R.E. (Minute 754)	Senior.
Lieut. R. P. Batty, R.E. (Minute 765)	Junior.
Capt. E. W. Barlow, R.A.F.	Senior.
Capt. Caulfield Brown, R.A.F.	Junior.
Capt. J. Crichton, R.A.F.	Senior.
Capt. C. L. H. Douglas-Lane, R.A.F.	Senior.
Capt. J. Durward, R.E. (Minute 754)	Senior.
Capt. F. Entwistle (Minute 754)	Senior.
Capt. W. Gillon, R.A.F.	Senior.
Lieut. G. R. Hay, R.E. (Minute 754)	Senior.
Lieut. J. Pryce-Jones, R.A.F.	Senior.
Lieut. J. Logie, R.A.F.	Senior.
Capt. R. M. B. Mackenzie, R.A.F.	Senior.
Capt. W. H. Pick, R.E.	Senior.
2nd Lieut. R. S. Read, R.E.	Senior.
Lieut. A. Walters, R.A.F.	Senior.

Officers who have passed an intermediate examination but have not yet completed the study for their degree are advised to complete their studies under the Government scheme. Upon satisfactory reports of completion of the University course, they will come under the terms of this minute, seniority counting as prescribed, but the time between demobilization and completion of the degree will not count towards seniority.

The Officers whose appointments come under this rule are :—

2nd Lieut. W. Andrews	Late R.A.F.
2nd Lieut. G. F. Henderson	R.A.F.
2nd Lieut. N. W. Lamb	Late R.A.F.
Capt. A. D. Macdonald	R.A.F.
2nd Lieut. C. C. Newman	R.A.F.
Capt. A. N. Pennel	R.A.F.
2nd Lieut. J. J. Somerville	R.A.F.

These officers may carry on in their present respective positions as acting professional assistants for the time being until arrangements are made for their resuming their University courses.

Subject to Treasury sanction, the provisions of the present order may be extended to the following officers recently demobilised :—

2nd Lieut. J. S. Begg.	2nd Lieut. R. H. Kelso.
Lieut. P. T. Cresswell.	2nd Lieut. A. Milne.
2nd Lieut. B. G. Fletcher.	Lieut. R. Stewart.
Lieut. H. A. Gillman.	Lieut. A. Stocks.
Lieut. E. J Goodfellow.	2nd Lieut. J. W. Watts.
2nd Lieut. A. T. Guinevan.	Sergt. A. Jordan M.Sc. (Leeds), R.E.

The Committee will take up the consideration of special cases of other officers on a future occasion.

Flying Officers may be appointed technical assistants for observing and computing at air stations. Salary £150 a year (inclusive of war bonus), to date from 20th birthday, with an addition of £7 10*s.* after each year of meteorological service, and a further addition of £10 for a Flying Officer.

Approved.

With regard to the promotion of members of the staff returning from service in the Army with specially high commendation for their work, it was agreed that such promotions should be within the discretion of the Director, provided they were within the existing establishment, but should be reported to the next Committee.

Special Leave.—Reported— that special leave for three years as from 20th September, 1919, had been granted to **L. G. Hemens** (Minute 754) in order that he might avail himself of the grant of the Board of Education to enable him to complete his degree course and quality for a post on the professional staff. (Order 886.)

802. Forecast Division.—**Gale-Warning Stations.**—Submitted—the following proposal by the Assistant Director in charge of Forecasting with reference to the number (200) of storm warning stations supplied free of charge under circular 205 :—

> "It is, therefore, recommended that the limit of 200 should be fixed for the present as the number of separate telegraphic addresses to which warnings are sent: and that the number of cones should be restricted only by the condition that free supplies would be made to all places warned by free telegram either direct or through Base Intelligence Officers"

Postponed.

Telegrams from Iceland.—Reported—that it had been found necessary to make provisional arrangements to accelerate the arrival of telegrams from Thorshavn, which involved an additional cost to the Office estimated at 8*d.* a day.

Approved.

Telegrams from Holland.—Reported—that additional reports by telegraph from Holland, at an approximate cost of 5*s.* 6*d.* a day, were required for the information of Aircraft crossing the North Sea.

It was agreed that such telegrams should be continued until definite arrangements for international exchange are arranged.

Payment for Wireless Telegrams received at Valentia.—Reported—the addition of £28|17*s.* 10*d.* to the Post Office account for wireless telegrams received at Valentia in accordance with arrangements made with the Admiralty in April (M.O. 05632).

Payment for Special Attendance at Post Office, South Kensington.—Reported—the receipt of a letter M.O. 13655 from the Secretary of the General Post Office stating that a revision of charges for special attendance had been found necessary in view of the increases in salaries.

803. INSTRUMENTS DIVISION.—**Commission on Instruments.**—(Minute 434.)—Recommended—that in future a charge of 5 per cent. instead of 10 per cent. should be made for "departmental expenses" in computing the cost of instruments supplied to the meteorological services of neutral powers.

Approved.

804. OBSERVATORIES AND STATIONS.—**Obituary.**—**M. Spence.**—Reported—the death of Mr. Magnus Spence, who retired in February last, after having been an exemplary observer for the Office for nearly twenty years.

Kew Observatory.—*Charges for testing Magnetic Instruments.*—Reported—the following summary of a memorandum M.O. 12,125 received from the Superintendent, Kew Observatory :—

The complete test of a unifilar magnetometer involves certain operations carried out at the National Physical Laboratory, for which fees as set out have hitherto been charged by the Laboratory :—

	£	*s.*	*d.*
Measurement and weighing of inertia bar		7	6
Measurement of deflection bar	1	0	0
Standardisation of two thermometers		2	6

The inclusive fee charged for a complete test was raised from £5 5*s.* to £7 10*s.* in 1913, after Kew Observatory became attached to the Meteorological Office.

The Director, National Physical Laboratory, has raised the question of the necessity of raising the National Physical Laboratory charges, and had expressed his willingness to adopt the following scale of charges :—

	£	*s.*	*d.*
Measurement and weighing of inertia bar		12	0
Measurement of an ordinary deflection bar at three points ...	1	3	0
Each additional point		3	6
Bars with reversible plugs (India Survey pattern), extra for each point		1	0
Standardisation of two thermometers		4	0

If any length exceed 1 metre a special fee to be charged.

The fraction of the fee passed on to National Physical Laboratory would thus vary between £1 19*s.* for a magnetometer with ordinary bar tested at three points only, to £2 11*s.* for one fitted with reversible plugs tested at five points (the standard number tested hitherto).

It is recommended that the fee for testing a unifilar magnetometer be increased to £10, and that the test be made to include an intercomparison of the inertia bar with a standard bar, an addition to the number of inertia experiments, and an addition to the number of observations of H.

It is further recommended that other charges be increased as follows :—

	Present Fee.			Proposed Fee.		
	£	*s.*	*d.*	£	*s.*	*d.*
Separate collimator magnet with inertia bar	3	15	0	5	5	0
Separate collimator magnet without inertia bar	3	5	0	4	10	0
Separate collimator magnet, if moment of inertia be not found	2	5	0	3	5	0
Dip circle with one pair of needles	1	1	0	1	10	0
Each additional or separate needle		10	6		15	0
Determination of total force constant	1	1	0	1	10	0
Total force weights. Set when individually weighed ...		10	6		15	0
Gymbals and fittings tested for magnetism	1	1	0	1	10	0

Meteorological Office, S.W.7,
13th October, 1919.

Approved.

Arrangements for Caretaker (Minute 792).—Reported—that temporary arrangements had been made for a caretaker at Kew Observatory on the lines of the following order; and that the question of a more permanent arrangement was under consideration:—

Order No. 911, Kew Observatory. A payment of £1 a week, inclusive of war bonus, with allowance of gas and fire, to Mrs. Corrin is authorised until further notice, so long as she continues to reside at Kew Observatory and discharge the duties of caretaker; to date from last payment made to or on behalf of the late caretaker.

Eskdalemuir.—Authority was given for Dr. Mitchell to engage a mechanic in place of Mr. Leggat (resigned), at a salary of 50*s.* a week and quarters, with a further increment of 5*s.* a week a year hence.

Valencia Observatory.—Reported—that approval had been given to suggestions made by the Superintendent (M.O. 13775) that the field centred about 600 feet S.E. of the observatory be let on the conacre system for a period of three years at a rent of about £3 5*s.* per acre, and that the field being returned during the present winter be sown with grass seed.

South Farnborough (Minute 775).—*Payment of Travelling Expenses.*—Reported—a letter M.O. 10168 from the Meteorologist-in-Charge asking for instruction on the general question of authority for travelling on the business of the W/T. inquiry.

Postponed.

Submitted—a *Report* M.O. 9803 *on the Installation and Operation of Direction-finding Stations for the location of thunderstorms* by the Meteorologist-in-Charge.

Southport (Minute 766).—Reported—the receipt of the following letter (M.O. 11409) from the Town Clerk at Southport:—

M.O. 11409.—P.F. 175.

Town Hall, Southport.
9th September, 1919.

SIR,

WITH further reference to your letter of the 1st ultimo, I beg to inform you that my Town Council have confirmed the following resolution of my Parks Committee:—

RESOLVED:—"That in consideration of the Meteorological Office contributing to the Corporation a sum of £50 per annum and to the Borough Meteorologist supplying the Meteorological Office at his own expense with 500 copies of the Southport Annual Results in a form to be approved by the Meteorological Office, for distribution throughout the meteorological world, this Committee pay to Mr. Baxendell an additional £75 per annum."

The payment to Mr. Baxendell of the additional £75 per annum will date as from the 1st April, 1919. I am asking our Borough Treasurer to send you a formal account each year for £50 when he hears from Mr. Baxendell that he has despatched to you the 500 copies of the Southport Annual Results.

Yours, &c.,
J. ERNEST JARRATT,
Town Clerk.

The Director,
Meteorological Office, S.W.7.

Glasgow.—Reported—the receipt of a letter M.O. 13351 from the Town Clerk of Glasgow stating that the Corporation had resolved to contribute £50 towards the Meteorological Department, Glasgow Observatory, but were of opinion that in future the expenditure should be met from the Parliamentary Grant, and asking for the views of the Director on the subject.

The Director agreed to communicate with the Town Clerk.

Ben Nevis Observatory.—Reported—that the question of re-opening the Ben Nevis Observatory was under consideration.

Glencarron.—Recommended—that, in accordance with Minute 544, a payment of £5 per annum be made to the Meteorological station at Glencarron for the supply of reports for the Weekly Weather Report.

Approved.

Birr Castle.—Recommended—that the demand M.O. 12782 of the observer, Mr. Thomas Fegan, for a payment at the rate of £60 per annum, and that from this sum £20 be paid to the deputy observer, be complied with as from 1st October, 1919, and pending report on more suitable arrangements for the station.

Approved.

Edinburgh Office (Minute 783).—Reference was made to the letter previously reported from the Superintendent of the Edinburgh Office. It was agreed that the question of the expansion and co-ordination of the meteorological work in Scotland be brought up for consideration after the appointment of a representative for Scotland on the Committee.

Inspections.—Eskdalemuir.—Submitted—a report by the Superintendent of Kew Observatory on his visit to Eskdalemuir on October 18th and 19th. (M.O. 13492.)

Spurn Head and Gorleston Anemometers.—Reported—the following recommendation with regard to the anemometers at Spurn Head and Gorleston, previously circulated and approved by the Committee.

M.O. 11147.

Spurn Head Anemometer.

The station at Spurn Head has been inspected by the Superintendent of Instruments, who reports that the present condition of the anemometer is very unsatisfactory. The chief difficulty arises from the lack of adequate protection against blown sand, and to make suitable provision against this would involve considerable expenditure. It is recommended that the present wooden hut, which is far from sand-proof, be replaced by a concrete hut, and that the instrument itself, which has become defective in several respects, be replaced by a new instrument from Office stock. The tower requires painting, but is otherwise in good condition. The construction of the concrete hut can probably be carried out by the detachment of Royal Engineers on the spot with surplus material now lying at Kilnsea, if early application be made to the proper authority. It is estimated that the erection of the hut, fixing of the anemometer and other minor repairs necessary to put the instrumental equipment of the station on a satisfactory position will cost between £45 and £60, in addition to the cost of the new anemometer, £85. Against the latter sum must be set the value of the anemometer to be returned. The only practicable alternative would be the withdrawal of the anemometer, a course which would involve the sacrifice of the tower erected by the Office only a few years ago. The unique conditions of exposure obtained at Spurn Head renders the continuance of the anemometer observations very desirable. It is, therefore, recommended that the suggestions made by the Inspector be approved.

NAPIER SHAW.

3rd September, 1919.

M.O. 11148.

Gorleston Anemometer.

The Office has maintained a cup anemometer at the Sailors' Home, Great Yarmouth, and a pressure-tube anemometer at the Coastguard station at Gorleston. The intention has been to equip the Gorleston station with an instrument for recording direction as well as velocity, and thereupon to dismantle the instrument at the Sailors' Home. During the war it has not been possible to carry out this programme.

Anemometers recording direction and velocity were ordered during the war to meet war requirements, but are not now required. Suitable instruments (value £85) are thus available from M.O. stock. It is proposed to carry out the original programme. The expenses of adapting the present arrangement at Gorleston and fixing the new instrument are estimated at about £80.

The allowance in the Office estimates for instruments is £300. It is proposed to charge the expenses at Spurn Head and Gorleston against that sum.

NAPIER SHAW.

3rd September, 1919.

Army Services (Minute 775).—Submitted M.O. 13678—being a report by the Superintendent of Army Services on a visit to artillery ranges, Shoeburyness, on 14th October, 1919.

Submitted also—the following report by the Superintendent on a visit to Porton Experimental Ground on 21st October, 1919:—

M.O. 13695.

I BEG to submit the following report of my visit to Porton Experimental Ground on October 21st.

I discussed the nature of the work to be done at Porton with Lieut-Col. Rendel, who is in command of the ground, and inspected the ground, which is nearly 5 miles long and about 3 miles wide in places.

The experimental work carried out will consist mainly in tests of various poison gases. A meteorological detachment is required to maintain the supply of meteorological data in connexion with the work. The meteorological work will consist of :—

First.—The supply of data at fixed times. It must be borne in mind that much of the experimental work will be carried out between sunset and sunrise, in order to realise active service conditions. Since a great deal of the work done will consist in investigating the proper use of gas shells, their design, &c., upper air data must be available.

Second.—Enquiry into the nature of the winds at different parts of the ground. As the latter offers a great variety of contour, it is absolutely necessary to work out the effect of contour on surface winds. The katabatic winds should be investigated in the greatest possible detail, with a view to their being employed in carrying forward the gas discharged from the projectiles. A thorough knowledge of these matters is necessary if it is proposed to make gas an efficient weapon.

In order to carry out this programme of meteorological work, it is necessary to have sufficient staff to man a central meteorological hut, as well as four wind posts distributed over the ground. The present meteorological hut is fully equipped for ground observations, but will require the

necessary equipment for pilot balloon work (theodolite, slide rule, balloons, hydrogen, &c.). Probably a portable anemometer would suffice for the wind posts.

The staff required should consist of :—

(1) For general consultation and manning the central hut :
1 Senior Professional Assistant.
1 Junior „ „
1 Staff Assistant.
3 Technical Assistants.

(2) For each out-post :
1 Technical Assistant.

Total staff :
1 Senior Professional Assistant.
1 Junior „ „
1 Staff Assistant.
7 Technical Assistants.

At present no experiments are being carried out at Porton, and the ground is all accessible. At times when gas is being discharged it will not be possible to have men out on all parts of the ground. I would, therefore, suggest that as soon as possible a Professional Assistant should be selected to take charge of this work, and should be sent down to Porton with three or four Technical Assistants, in order to see the nature of the ground, to get ideas from the officers in charge of various branches of the work, and commence his "meteorological survey" of the ground. A good deal could be done by the use of smoke bombs, which could be supplied by the Superintendent of Experiments, Porton.

D. BRUNT,
Superintendent for Army Services.

The Director,
Meteorological Office,
22nd October, 1919.

Reported also—the receipt of a letter (M.O. 13254) from Lieut.-Colonel Lewis, Superintendent of Experiments at Shoeburyness, stating that in his opinion the reduction of the number of the meteorological staff on artillery ranges during winter was inadvisable.

The question of combining the meteorological work at Shoeburyness with that at Grain was raised, and it was agreed that the Director and Colonel Lewis should consult on the matter.

Loan of Rangefinders.—Recommended—that endeavour be made to procure a number of rangefinders for use in observations with pilot-balloons at meteorological observatories. Colonel Lewis agreed to inquire whether the War Office has suitable rangefinders for disposal.

805. PUBLICATIONS.—Proofs of the following were laid on the table :—

M.O. 220f.—**Geophysical Memoirs, No. 16,** Aids to Forecasting, by E. Gold, F.R.S.

M.O. 204g.—**Meteorological and Magnetic Year Book, Part V.,** Réseau, Mondial, January and February, 1910.

806. ADVISORY COMMITTEE FOR ATMOSPHERIC POLLUTION (Minute 784).—Reported—that owing to increased cost and the difficulty of construction it has been found that the price of the automatic recording pollution gauge would be £35 instead of £12 10*s.*, and that the order for six gauges was therefore beyond the means of the Committee for the Investigation of Atmospheric Pollution.

It was agreed that the order should go forward and the amount be charged to the Office.

Reported—that a room for a chemical laboratory would be required when the question of accommodation of work on atmospheric pollution was considered.

807. DIRECTORS' REPORT AND ACCOUNTS :—

Gassiot Committee.—A meeting of the Gassiot Committee was held at the Royal Society on Wednesday, 29th October, at which the provisional programme for the year 1920–21 (Minute 791) was read and considered in respect of the work of the observatories at Richmond (Kew), Eskdalemuir and Cahirciveen (Valencia). The Committee agreed to make the usual recommendation to the President and Council of the Royal Society for the payment of the income of the Gassiot Trust and of the Rosse Fund to the Office for the maintenance of the work at Kew Observatory and Valencia Observatory respectively.

The proposal of the Norwegian Government that this country should take part in an international circumpolar investigation in connection with Amundsen's polar expedition was raised. The question of a temporary observing station for geophysics at Jan Mayen and of a permanent station in the Shetland Isles was mentioned. The Committee resolved to ask the President and Council of the Royal Society to take up the question and make a reply to the Foreign Office for communication to the Norwegian Government.

The first of the series of meetings for discussion was held at the Meteorological Office, South Kensington, on Monday, November 3rd. The subject selected was the new method of forecasting indicated by Professor V. Bjerknes, of the Bergen Geophysical Institute, and his son. Professor Bjerknes, who happened to be passing through London on his way home from Paris, was present and took part in the discussion.

Submitted—a note (M.O. 13511) on the work of the Meteorological Section, R.E., in N. Russia by Capt. W. H. Pick.

Reported—the receipt of a letter from the Naval Intelligence Department of the Admiralty expressing appreciation of the services rendered by the Meteorological Office to the Geographical Section of the Department during the war.

Reported—the receipt of a letter (M.O. 11334) from the Officer Commanding Royal Air Force to the Officer Commanding Meteorological Section, R.E., British Army of the Rhine, thanking the Section for the assistance rendered to the Royal Air Force by the accurate and punctual forecasts provided by the Section.

Submitted—the following memorandum (M.O. 13404) by the Superintendent of Instruments on the supply of meteorological instruments to H.M. ships and dockyards on the requisition of the Director of Stores, Admiralty :—

The following proposed list of rates for the supply of instruments to H.M. Ships and Dockyards during the six months ending 31st March, 1920, was communicated to the Director of Stores, Admiralty, on 23rd October, for approval, in accordance with the arrangement which was made with the Admiralty in the early months of 1918. The rates were approved by the Admiralty on 31st October. The rates are intended to cover :—

(*a*) prime cost of the instrument ;

(*b*) 5 per cent. departmental expenses ;

(*c*) cost of packing-cases and packing materials ;

(*d*) cost of transmission from Office to the dockyard, unless the dockyard is overseas, when it includes cost of transmission to the Superintendent, R.N. Store Depot, West India Docks, or another London Dock ;

(*e*) cost of insurance, in the case of mercurial barometers.

The rates are actually obtained by adding 8 per cent. to the prime cost of the instruments, 5 per cent. being for departmental expenses and 3 per cent. for the remaining incidental expenses.

The rates differ from those in operation to the 30th September last in three respects as follows :—

Barometers, mercurial	Old rate	8	4	0	New rate	8	8	0
„ aneroid, Mk. I	„ „	3	10	9	„ „	3	6	6
Barographs	„ „	4	6	6	„ „	6	2	0

The large increase in the rate for barographs is due to reconsideration, at the urgent request of the firm, on reorganisation of orders placed with Short and Mason, Ltd., many months ago on exceptionally favourable terms (Minute 787).

Mercurial barometers and aneroid barometers received from ships and dockyards in an unserviceable condition are valued and repurchased from the Admiralty according to a schedule which specifies the credit due, expressed in tenths of the rates.

A comparison of the actual expenses incurred by the Office with the amounts recovered under the scheme during recent months shows a credit balance of £10 on a turnover of £813.

Reported—that an Assmann psychrometer had been lent to J. W. Capstick, of Trinity College, Cambridge, Professor at the City Guilds Technical College.

With regard to the items under instruments, it was agreed that a letter should be sent to the Colonial Office suggesting the possibility of disposing of the surplus instruments to the meteorological institutes of the Colonies.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on the 14th October, 1919	254	10	8
Receipts from 15th October, 1919	13,733	16	3
	13,988	6	11
Cheques drawn from 15th October, 1919	5,555	12	5
Bank balance on 4th November, 1919	£8,432	14	6

Submitted—The following Statement of Accounts for the six months ended 30th September, 1919, prepared for audit by the Comptroller and Auditor-General :—

RECEIPTS.						PAYMENTS.			
1918. £ s. d.		1919. £ s. d.	£ s. d.	1918. £ s. d.			1919. £ s. d.	£ s. d.
99 14 10	Balance from year 1918-19	—	108 10 0	500 0 0	Adviser and Director...		—	500 0 0
16,750 0 0	Parliamentary vote	—	23,500 0 0		Acting Director—			
	Do. (British			67 3 9	Col. H. G. Lyons ...		—	13 8 9
—	rainfall)... ...	—	5,584 6 0					
	DEPARTMENTAL EXPENSES REPAID:				OFFICE SALARIES (including Insurance):			
				6,664 12 7	Monthly		10,521 14 1	
4 19 6	Forecasts, &c. ...	33 16 0		1,465 6 10	Weekly		1,507 19 0	
	Marine, Statistical, and Administra-							12,029 13 1
49 14 3	tive	57 16 4			EXPENSES OF OFFICE:			
				349 11 11	Rent, Heating, and Lighting		350 2 5	
690 9 4	Instruments ...	447 2 2			Furniture and Equip-			
			538 14 6	24 10 3	ment		5 10 11	
	INCIDENTAL EXPENSES REPAID:			3 9 4	Library		49 6 3	
					Insurances and Re-			
81 18 7	D.W. Report ...	517 13 7		41 5 4	pairs		13 10 3	
					Incidental Expenses			
99 2 2	Divisional ...	62 11 2			and Consumable			
	Advertising Ac-			240 7 7	Stores		201 11 9	
6 4 8	count	8 5 4		3 15 0	Advertising Account		—	
			588 10 1					620 1 7
					POST OFFICE:			
48 10 1	STATIONERY OFFICE	—	96 3 0	619 16 7	Postage		434 14 5	
	TELEGRAPH			189 1 0	Telephones		128 15 2	
	CHARGES RE-			1,755 18 7	Telegrams		1,086 15 8	
124 9 7	PAID	—	38 4 1					1,650 5 3
	TELEPHONE			96 0 8	STATIONERY OFFICE...		—	
85 10 10	CHARGES REPAID	—	100 19 3	172 2 5	TRAVELLING EXPENSES		—	199 14 4
—	INSPECTIONS ...	—	56 0 0		SUPERANNUATION:			
	INSTRUMENTS:				Pensions not charge-			
605 15 10	Royal Navy ...	—	—	12 10 0	able on Fund ...		3 9 10	
	By Sales from				Pensions chargeable on			
13,556 10 9	Stock	—	8,437 6 9	66 1 0	Fund		41 0 2	
	SUPERANNUATION			266 5 0	Annuities		268 2 6	
	ACCOUNT:			—	Contribution to Fund		—	
273 15 0	Annuities... ...	283 2 6						312 12 6
	Interest on Invest-			623 16 0	COST OF INSTRUMENTS: Royal Navy		—	
25 1 4	ments	25 1 4		13,235 8 0	For Stock		—	11,859 18 7
			308 3 10					
	*OBSERVATORIES, BRANCHES, AND STATIONS:				*OBSERVATORIES, BRANCHES, AND STATIONS:			
196 13 9	Richmond ...	7 1 2		1,220 12 7	Richmond		1,921 2 5	
506 18 8	Eskdalemuir ...	512 3 4		1,013 19 11	Eskdalemuir ...		1,110 9 8	
7 9 0	Cahirciveen ...	7 9 0		460 18 3	Cahirciveen... ...		669 2 7	
—	Farnborough ...	—		424 3 1	Farnborough ...		368 1 2	
	British Rainfall			—	British Rainfall Org.		158 6 7	
—	Org.	—		—	Do. (Capital)		5,584 6 0	
				—	Do. (Stamp)		11 5 0	
8 17 4	Falmouth... ...	—		287 15 8	Falmouth		286 12 9	
—	Benson	—		280 17 6	Benson		461 10 9	
—	Shoeburyness ...	—		—	Shoeburyness ...		492 14 8	
—	West Lavington ...	—		—	West Lavington ...		24 11 0	
—	Edinburgh ...	—		220 7 3	Edinburgh		260 18 3	
	Investigation of				Investigation of Atmospheric Pollution			
	Atmospheric			169 6 11	... ...		194 13 6	
250 0 0	Pollution ...	—		906 5 1	Miscellaneous ...		745 11 6	
85 7 11	Miscellaneous ...	101 7 1		—	Aberdeen		120 12 5	
			628 0 7					12,409 18 3
				1,221 12 1	Balance due to Bank on April 1st, 1919 ...		—	49 0 4
3 0 0	National War Bonds	—	—		BALANCE:			
—	Salaries refunded...	—	0 2 10	784 15 8	Cash at Bank ...		—	206 4 10
				122 7 7	„ at Office ...		—	134 3 5
£33,560 3 5			£39,985 0 1	£33,560 3 5				£39,985 0 11

* For details, see separate statement.

Statement of Assets and Liabilities on 30th September, 1919.

LIABILITIES.				ASSETS.			
£ s. d.		£ s. d.	£ s. d.			£ s. d.	
1,152 13 4	To Admiralty	—	907 3 3	By cash at Bank and Office		340 8	
10,733 18 7	„ sundry creditors	9,611 14 5	16 8 2	„ salaries reserved (premiums) ...		16 8	
976 8 6	„ Superannuation	1,976 8 6	7,729 19 0	„ M.O. instruments in stock ...		13,163 5	
5 1 6	„ balance	4,396 5 2	2,646 8 2	„ sundry debtors		1,884 2	
			1,568 3 4	„ Admiralty		580 4	
£12,868 1 11		£15,984 8 1	£12,868 1 11			£15,984 8	

OBSERVATORY ACCOUNTS.

Statement of Receipts and Expenditure (to nearest £) during the six months ended 30th September, 1919, with the corresponding amounts for the same period of last year.

Service.	Richmond.		Eskdale.		Valencia.		Farnborough.		Falmouth.		Benson.		British Rainfall Organisation.		Advisory Committee on Atmospheric Pollution.		Shoeburyness.		West Lavington.		Edinburgh.		Aberdeen.		Miscellaneous Stations.		Totals.	
	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.
EXPENDITURE.	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Subventions	—	—	—	—	—	—	—	—	15	15	—	—	—	5,584	—	—	—	—	—	—	205	245	147	147	25	25	392	6,016
Cost of Forms	78	—	1	—	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	298	122	380	124
Salaries, Scheduled	968	1,696	686	860	372	584	316	345	202	170	225	413	—	158	25	155	—	490	—	25	—	—	—	63	393	410	3,187	5,369
Do. Overtime, &c. ...	17	18	—	—	—	—	—	—	—	9	—	—	—	—	22	7	—	—	—	—	—	—	—	—	—	—	39	34
Rent, Rates, Taxes, Repairs, and Insurance	28	65	14	31	32	28	—	—	29	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1	107	175
Fuel and Lighting	46	67	201	66	8	6	—	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	256	141
Equipment and Instruments	9	5	4	23	8	5	45	6	—	—	4	10	—	—	—	8	—	—	—	—	—	—	—	58	4	4	74	119
Consumable Stores	28	26	6	18	5	2	1	—	—	—	30	13	—	—	2	—	—	—	—	—	—	—	—	—	—	1	72	60
Incidental Expenses	6	15	5	8	8	10	20	3	—	—	1	6	—	11	116	7	—	—	—	—	—	—	—	—	11	17	167	77
Books, &c.	2	—	12	6	5	10	2	—	1	—	1	—	—	—	4	—	—	—	—	—	—	—	—	—	1	—	28	16
Post Office Charges	34	29	28	40	20	21	35	13	39	42	17	17	—	—	—	2	—	—	—	—	—	—	—	—	24	18	197	182
Motor Car Expenses, &c. ...	5	—	57	58	—	1	5	1	2	—	1	1	—	—	—	17	—	2	—	—	15	16	—	—	—	—	85	96
TOTALS	1,221	1,921	1,014	1,110	461	669	424	368	288	286	280	462	—	5,753	169	196	—	492	—	25	220	261	147	268	760	598	4,984	12,409
RECEIPTS.																												
Subventions :—																												
Gassiot Fund	110	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	110	—
Parliamentary Grant ...	—	—	500	500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	500	500
Rosse Fund	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Advisory Committee on Atmospheric Pollution.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	250	—	—	—	—	—	—	—	—	—	—	—	250	—
Expenses refunded locally ...	65	4	7	12	7	7	—	—	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	—	95	23
Tests and Commissions ...	8	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	3
Cost of Books and Forms ...	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	79	102	94	102
TOTALS	196	7	507	512	7	7	—	—	9	—	—	—	—	—	250	—	—	—	—	—	—	—	—	—	86	102	1,055	628

METEOROLOGICAL FIELD SERVICE, &c.

Statement of Receipts and Expenditure (to nearest £) during the six months ended 30th September, 1919, with the corresponding amounts for the same period of last year.

Service.	France.		Dardanelles.		Met. Section. R.E. (Home)		North Russian Expeditionary Force.		Totals.	
	1918–19.	1919–20.	1918–19.	1919–20.	1918–19.	1919–20.	1918–19.	1919–20.	1918–19.	1919–20.
EXPENDITURE.	£	£	£	£	£	£	£	£	£	£
Salaries :										
Lieut.-Col. E. Gold ...	31	—	—	—	—	—	—	—	31	—
Major A. H. R. Goldie ...	1	—	—	—	—	—	—	—	1	—
Sergt R. Pyser	9	7	—	—	—	—	—	—	9	7
„ E. L. Clinch ...	24	16	—	—	—	—	—	—	24	16
„ C. V. Ockenden ...	—	—	9	—	—	27	—	—	9	27
„ R. M. Poulter ...	—	—	—	—	—	—	—	22	—	22
Corpl. A. G. Goad ...	9	6	—	—	—	—	—	—	9	6
„ C. F. J. Jestico ...	3	14	—	—	—	—	—	—	3	14
Pte. W. J. Fowler ...	—	—	—	—	—	—	—	6	—	6
Incidental Expenses:										
Postage	13	3	4	—	—	1	—	—	17	4
Telegrams	—	—	265	—	—	—	—	—	265	—
Printed books	—	5	—	—	—	—	—	—	—	5
Miscellaneous	—	—	—	—	—	—	—	—	—	—
Instruments	2,081	78	432	—	—	209	—	154	2,513	441
TOTALS	2,171	129	710	—	—	237	—	182	2,881	548
RECEIPTS.										
Admiralty	—	—	—	—	—	—	—	—	—	—
War Office	2,789	45	475	—	—	209	—	527	3,264	781
TOTALS	2,789	45	475	—	—	209	—	527	3,264	781

NINETY-NINTH MEETING.

Air Ministry, Kingsway, W.C.2, 3rd December, 1919.

PRESENT :

THE DIRECTOR IN THE CHAIR.

THE HYDROGRAPHER.
LIEUT.-COL. LEWIS.
COLONEL LYONS.
MR. MCANALLY.
MR. MEADOWCROFT.
SIR THOMAS MIDDLETON.
DR. SCHUSTER.
DR. WEDDERBURN.

Mr. BERTRAM was in attendance.

Mr. L. V. Meadowcroft, F.E., attended the meeting as finance representative of the Air Ministry, in place of Mr. Ross.

808. The Minutes 788–795 of the Meeting of 15th October, previously circulated in revise, and the Minutes 796–807 of the last Meeting previously circulated in proof, were taken as read, and with certain modifications confirmed.

The Director asked for authority to modify the programme of publications for 1920–1921 (Minute 800) by the addition of a publication entitled "Meteorological Observations in the British Crown Colonies, 1910–1919," the preparation of which was practically completed.

Approved.

Reported—that in reply to a letter (B. 11304 C.G.C.A.) addressed to the Under-Secretary of State for Scotland in accordance with the decision of Minute 796 of the last meeting a letter (M.O. 16191) had been received from the General Secretary of the Royal Society of Edinburgh stating "that the Council of the Royal Society of Edinburgh have elected E. M. Wedderburn, Esq., M.A., D.Sc., W.S., 2, Glenfinlas Street, Edinburgh, as their representative."

809. CORRESPONDENCE.—**Letter from Town Clerk of Glasgow** (Minute 804).—Reported—a reply to the Town Clerk of Glasgow circulated in draft form.

Admiralty (Minute 762).—Reported—the receipt of the following letter from the Hydrographer:—

M.O.14,402.—A.M.S.209/19.

Hydrographic Dept.,
Admiralty, S.W. 1.,
10th November, 1919.

SIR,

I BEG to refer to Minutes of Conference held at Air Ministry on Tuesday, 2nd September, 1919, on the subject of Wireless Weather Reports, and to enquire with special regard to the general question of the circulation of Meteorological messages, raised at that Conference, whether steps will be taken to refer this question officially to the Air Ministry and departments concerned, with a view to arriving at a decision as to the Department to be held responsible for the reception and distribution of Wireless Meteorological messages for the benefit of the Meteorological Services and in order that overlapping of wireless work may be avoided.

It would appear desirable that these W/T messages which are at present received by the Admiralty and transmitted to the Meteorological Office and Air Ministry Meteorological Section, should be dealt with directly by the Meteorological Office Air Ministry as soon as this can be arranged for, observing that this transfer would necessarily take place when the Naval Meteorological Service is embodied with the Air Ministry. I would be glad if this could be put on the agenda of the next meeting of the Meteorological Committee, which it is intended will take place on 3rd December of this year.

I am, &c.,
F. LEARMONTH,
Hydrographer.

The Director,
Meteorological Office.

The Director reported that it would he necessary to hold a meeting of the general conference on Wireless Weather Reports, and to appoint a new sub-committee to discuss the question.

The Hydrographer emphasised the necessity of working from one central station, and suggested that the station should be located at the Air Ministry.

It was agreed that a copy of the Hydrographer's letter should be sent to Colonel Blandy, Controller of Communications, and that he should be asked to get into communication with the Hydrographer on the subject.

H.M. Stationery Office (Minute 797).—The Director reported that since the last meeting of the Committee, in company with Mr. McAnally, he had had an interview with Col. Scorgie representing Mr. Codling, Controller of H.M. Stationery Office, but had been unable to obtain the sanction of the Stationery Office to the transfer of the Meteorological Office Press to Canada House. He had, therefore, ordered a list to be made of the requisitions still outstanding on the press on 18th November, which it was desirable should be completed by the press at South Kensington. The following letter had, however, been received from the Stationery Office:—

M.O.16219.—L.4192/19.

H.M. Stationery Office,
Westminster, S.W 1.
2nd December, 1919.

DEAR SIR NAPIER SHAW,

SINCE our meeting at the Air Ministry on 18th November, very full and exhaustive investigations have been made as to the capacity of certain large contractors with premises near to Canada House to carry out the lithographic printing you require, and although more than one firm has the actual capacity it is not certain in practice that it would be so completely at your service as to rule out the possibility of a hitch in the execution of your urgent work. Theoretically the advantages of a bigger plant and equipment, which I offered to you as compensation for the press not being on the

premises, should be obtainable. In practice there may be a doubt, and therefore in pursuance of the undertaking which I gave you at the conference the Controller will take no risk of imperilling your work.

It is proposed therefore to instal a lithographic press for your work in the basement of Canada House under the management of this Department, and as soon as Treasury concurrence is obtained we shall proceed with the installation. In these circumstances no official reply need be made to your letter 16,149 of the 29th ultimo.

Sincerely yours,
L. G. SCORGIE.

SIR NAPIER SHAW, LL.D., SC.D., F.R.S.,
The Meteorological Office,
Air Ministry.

810. ORGANISATION.—At the request of the President the consideration of the various points of organisation which were raised in a memorandum by the Director was deferred.

811. CO-ORDINATED SERVICE OF THE METEOROLOGICAL OFFICE.—**Report of Finance Sub-Committee** (Minute 800).—The Director reported that endeavour had been made to carry out the resolution of the last meeting concerning the appointment on demobilisation of officers of the R.A.F. (Minute 801), but that the finance representative on the Committee had ruled that the appointments could not go forward until the proposals for the future establishment of the Office had been submitted to, and approved by, the Treasury.

The following report of the finance sub-committee, previously circulated, was read :—

The Sub-Committee met on Thursday, 27th November, 1919, all the members being present. In addition, Mr. L. V. Meadowcroft, F.E., attended. The Sub-Committee had before them the following documents as basis of regulation of financial procedure, and attention was directed to the paragraphs quoted.

1. *Secret G. 244.*—Referred to in the decision of the Home Affairs Committee of the War Cabinet of 8th May, 1919, as setting out the lines on which the co-ordinated meteorological service was to be attached to the Air Ministry (Minute 762).

2. *Treasury letter 23902/19 of 23rd June, 1919* (Minute 772).
"It would appear to follow that the Office should be transferred as a 'going concern,' with a non-surrenderable grant-in-aid as at present under the vote for Scientific Investigation (Civil Services, Class IV., vote 8, sub-head B.) and self-contained as to finance, secretariat and registry services. For the time being They apprehend that no other solution is possible in order not to break the continuity of the work of the Office."

3. *Treasury Minute of 20th May, 1905* (*Report 1905–6, p. 46*) defining the terms of appointment of the Meteorological Committee and the regulations for the management of the grant, viz. :—
"3. Subject to the general control of the Committee and to such regulations as may be laid down by the Treasury, the Director will be responsible for the administration of the Office.
"7. The grant will be administered by the Committee, who may, with the consent of the Treasury, delegate to the Director such powers of expenditure as they consider proper.
"9. The staff will be appointed and their salaries fixed by the Committee on the recommendation of the Director."

4. *Treasury letter 31348/19 of 4th November* (Minute 797).
"In the votes for the Air Ministry, shortly to be laid before Parliament, provision should be taken for an inclusive sum as grant to the Meteorological Office in supplementation of the grant-in Class IV., vote 8, sub-head B., of £47,000. . . . . .
"It would be necessary for Their Lordships to receive a certificate that expenditure to that amount had been duly passed by the accounting officer of the Air Ministry (acting on Their behalf)."

The Director explained that, according to his note of an interview with Mr. Barstow in company with Mr. Ross on 17th October, the Treasury intended the vote in supplementation of the grant-in-aid of £47,000 for the year 1919–20, which would be borne on Air votes to be added to the present grant-in-aid and treated in like manner—*i.e.*, discharged as regards the Air Ministry as the present grant direct from the Treasury is discharged by a voucher of the Director acting for the Committee, and verified by the usual audit of the accounts by the Exchequer and Audit Department as having the authority of the Committee for the several items.

Mr. Ross confirmed the note, but laid down the principle that the finance representative of the Air Ministry on the Committee would be subject to the ordinary rules as to obtaining Treasury authority for the items of meteorological expenditure, as with other items of expenditure of the Air Ministry, in spite of the fact that the money was assigned as a *grant-in-aid.*

It was arranged that the Director should seek an interview with Mr. Bland, A.F.S., with the object of ascertaining the views of the Treasury upon the question.

An estimate was submitted for the expenditure of the Meteorological Service for the year 1919–20, drawn up by the Director at the request of Mr. Meadowcroft on 10th November, based upon the scheme of Head Quarters staff contributive and distributive stations set out in Minute 800, but omitting those establishments which, after consultation with the Controller-General of Civil Aviation, could be regarded as not immediately required.

The omissions and revisions are set out in M.O. 16140; the estimate gives the following as the establishments to be maintained:—

H.Q. London—
Meteorological Office, Air Ministry.
" " South Kensington.
British Rainfall Organization, 62, Camden Square.
Investigation of Atmospheric Pollution, 47, Victoria Street.

Edinburgh—
122, George Street.

Country Stations.

Contributive.	Distributive.
Kew Observatory, Richmond.	Hounslow.
South Farnborough Physical Station.	Lympne.
Falmouth Observatory.	Felixstowe.
Benson Upper Air Observatory.	Grain.
Holyhead Upper Air Station.	Andover.
Scilly Upper Air Station.	Calshot.
Valencia Observatory.	Howden.
Aberdeen Observatory.	Cranwell.
Eskdalemuir Observatory.	Didsbury.
Lerwick Upper Air Station	Cattewater.
	Baldonnel.
	Orkney.

Malta. Mediterranean Centre.

No establishment is taken for the Eastern Mediterranean or the Cape or Australian route.

Army Services.	Marine Officers.
Shoeburyness.	Glasgow.
West Lavington.	Liverpool.

The numbers of the personnel estimated as necessary to maintain these establishments are as follows:—

——	H.Q.	Out.	Total.
Assistant Directors	2	2	4
Superintendents	9	2	11
Assistant Superintendents	4	9	13
Senior Professional Assistants	16	25	41
Junior Professional Assistants	13	10	23
Principal Assistants	9	4	13
Staff Assistants	16	24	40
Staff Clerks, Technical or Clerk Assistants, Clerk Computers	43	89	132
Unclassified	53	33	86
	165	198	363

A request from General Brooke-Popham, Director of Research, was read, asking for the provision of the meteorological staff necessary to undertake the investigation of the velocities of wind in the upper air, with greater precision than is required for ordinary purposes, along certain definite routes radiating from Biggin Hill, not more than one route at a time and length not to exceed 100 miles.

Mr. Meadowcroft explained that a sum of £25,000 had been included in the estimates presented to the Treasury in addition to £12,000 to cover war bonus of the Meteorological Office staff and the capital expenditure of the purchase of the British Rainfall Organization. Those sums would be available in supplementation of the grant-in-aid of £47,000 for the current year, but the inclusion in the estimates could only be regarded as approval of the general question of a grant. Before the sums available for the several purposes to which the money was to be applied could be regarded as approved an estimate of items and a schedule of establishment must be presented for the approval of the Treasury.

The approval by the Treasury of the detailed estimates on the lines of those of 10th November, would not provide expressly for the needs of the Director of Research, but it was understood that if the total authorised establishment were not exceeded staff might be employed from time to time elsewhere than at the places which had been selected as the basis of the estimates without referring the question to the Treasury.

The question of reducing the assigned establishments on the ground of the full staff not being required in the winter was raised, but it was thought inadvisable to modify the figures partly because the R.A.F. stations had special duties assigned to them irrespective of season, and for the Civil Aviation stations the period continued till 31st March of the next year, and partly because trained staff was now available which, if dispersed, could not be replaced by new men in less than two years.

Appointments to be Filled.—The Director submitted :—

(1) A list of names of persons already holding appointments made by the Meteorological Committee, and the number of vacancies to be filled in order to make up the establishment set out in the estimate of 10th November.

The numbers are summarised as follows :—

	Already Appointed.			Appointments to be considered.		
	H.Q.	Out.	Total.	H.Q.	Out.	Total.
Assistant Directors	2	2	4	0	0	0
Superintendents	8	2	10	1	0	1
Assistant Superintendents	—	2	2	4	7	11
Senior Professional Assistants	15*	5	20	3	20	23
Junior Professional Assistants	9†	4	13	5	6	11
Principal Clerks	7‡	2	9	7	2	9
Staff Assistants	18§	3	21	−1	21	20
Staff Clerks	30	20	50	13	69	82
Technical or Clerk Assistants						
Clerk Computers						
Unclassified	33	20	53	20	13	33

* 2 retiring. † 1 resigning. ‡ 5 retiring. § 1 retiring.

(2) M.O. Circular 002 revised giving the rates of pay of the various grades of appointment by the Meteorological Committee.

(3) A list of the names and qualifications of persons who had applied for appointment or promotion and of the officers and other ranks of the R.A.F. presently to be demobilised with their qualifications for appointment on a civil basis on the co-ordinated staff of the Office.

The representatives of the financial department ruled that no progress could be made until estimates setting out the establishment and salaries had been prepared and approved by the Treasury. The Director undertook to seek an interview with Sir Arthur Robinson in order to obtain the approval of the authorities for the appointments indicated in Minute 801 as soon as possible.

Establishment for Malta.—The question of an Establishment for Malta with a list of suggested personnel by Major Hearle had already been put forward. It was thought it might be covered by the general approval of the estimates of 10th November, but approval had not yet been obtained and the consideration of the proposals put forward by Major Hearle was accordingly deferred.

Meteorological Office,
Air Ministry,
Kingsway, W.C. 2.,
29th November, 1919.

The Director reported that in place of the personal interview with Sir Arthur Robinson suggested by the Sub-Committee, a conference of members representing the financial and secretarial divisions of the Air Ministry had been arranged which met on the morning of 3rd December in the room of the Assistant Secretary.

The Conference agreed that there was no objection to the proposals going to the Treasury on the basis of the salaries set out with the provision that the salaries of the professional staff were subject to the findings of the Treasury Committee, and that the salaries of the clerical and technical staff were subject to revision on account of changes in war bonus. The Director undertook to furnish details of the proposed establishment for submission to the Treasury.

The Conference also recommended that steps should be taken to get immediate authority for the appointment of the R.A.F. officers who were to be demobilised on 22nd December, 1919.

Naval Meteorological Service.—The Hydrographer raised the question of the transfer of the Naval Meteorological Service to the Meteorological Office. He reported that the officers had already been demobilised, and that the question of their future salaries could not be settled until it had been decided whether the transfer should take place. He stated that the staff referred to consisted of 6 officers and 18 clerical staff, but that it would not be necessary for the whole number to be taken over. The Hydrographer also reported that a comparatively small section would be sufficient to meet the Admiralty requirements after the transfer took place, but that an officer was needed to keep in touch with the naval areas and to represent the interests of the Navy.

The Director undertook to send an officer from the Meteorological Office to make preliminary inquiry, and the Hydrographer agreed to provide a list of the staff at present employed, with a statement of their qualifications.

The Director pointed out that the accommodation available for the Admiralty Service in the rooms already allocated to the Meteorological Office was not very suitable, and suggested that rooms now occupied by F.O.5. should be made available for the staff in conjunction with that of the Marine Division.

Estimates and Establishment for the remainder of 1919–1920 and for 1920–1921.—The Director submitted the following memorandum on the estimates for 1919–1920, prepared at the request of Mr. Meadowcroft, he undertook also to prepare and circulate the details of the estimated expenditure other than salaries for the year 1920–1921.

AN ESTIMATE OF THE EXPENSES OF THE CO-ORDINATED SERVICE OF THE METEOROLOGICAL OFFICE IN THE FINANCIAL YEAR 1919–20.

Meteorological Office.—We start from the expenses of the Meteorological Office as set out in the Amended Estimates for the year 1919–20 approved by Treasury Letter 5766/19, dated 13th February, 1919, sanctioning a grant in aid of £47,000 (M.O. Minute 749).

The grant provides for the maintenance of the central establishment at South Kensington, seven observatories for Meteorology and Geophysical subjects (Kew, Eskdalemuir, Valencia, Aberdeen, Falmouth, Benson, South Farnborough), three special stations for the service of the Army (artillery, gas and sound ranging), 500 auxiliary observatories, including telegraphic reporting stations, climatological stations of the second and third orders (mostly voluntary) in the British Isles, and the supervision of a number of stations in Crown Colonies and Protectorates. It also maintains the organisation for obtaining, compiling, and discussing meteorological observations from ships on all oceans.

The expenses may be summarised as follows :—	£	£
Salaries : Central Office and Observatories		34,226
Army Services		3,394
Subventions for Auxiliary Observatories		345
Telegraphic Reporting Stations		1,000
Edinburgh Office		500
Atmospheric Pollution		500
British Rainfall		55
		40,020
Add for War Bonus Award 84 sanctioned with reservations by Treasury Letter 17335/19 (M.O. 6830): "they will be prepared to make such supplementary provision as may be required for the purpose"		5,500
Total expenditure for salaries		45,520
Incidental expenses, rent, fuel, lighting, postage, telegrams (including international services), telephones, travelling expenses, &c.		10,149
	£	
Superannuation	1,719	
Less appropriation in aid	604	
		1,115
Total expenditure		56,784
Less appropriations in aid		2,784
Total charge on public funds		54,000

Of this sum £1,000 was to be derived from parliamentary vote to the Royal Society for the observatory at Eskdalemuir and £500 for the expenses of Atmospheric Pollution from the Department of Scientific and Industrial Research. The charge upon the *Meteorological Office vote* was therefore expected to be, after adding the war bonus, £52,500.

The balance in the statement of assets and liabilities of the Office in the accounts for the six months ended 30th September, 1919, was £4,396 5*s.* 2*d.*

It should be noted that the balance sheet includes a sum of £13,163 5*s.* 2*d.* for meteorolgical *Instruments in stock* for the supply of the Navy and Army and Air Force as well as the Office and its stations, to which reference will be made later. There are still outstanding orders for stock to the extent of £3,503 2*s.* 7*d.*

R.A.F. Meteorological Services.—With this undertaking has now to be incorporated the Meteorological Service of the Air Ministry for which there is no corresponding estimate. On

August 20th, 1919 it included Headquarters establishment at Kingsway, 40 stations in the British Isles (of which eight were at that time temporarily suspended) and one at Malta. The officers were—

At H.Q.	At Stations.	Salaries.
		£
(Colonel)	—	(1,000)
2 Majors	—	1,557
9 Captains	8 Captains	9,747
5 Lieutenants	15 Lieutenants	9,000
6 2nd Lieutenants	14 2nd Lieutenants	7,720
		29,024
7 men 9 women	... ... 196 other ranks, say	23,048
	Total Salaries	52,072

I have no means of estimating in detail the other expenses but on examining the accounts of the Meteorological Office I find for the ratio of other expenses (exclusive of superannuation) to salaries about one-fifth at the Central Office (one-fourth including superannuation) and one-fourth at the Observatories. The stations of the Air Service are less accessible than the Observatories of the Office and the cost of transport which does not occur with M.O. Stations as a rule would be considerable. I therefore take a quarter of the amount of the salaries for the other expenses on the same method of working as the Meteorological Office 13,018

Total expenses of the Meteorological Service of the Air Ministry as on 20th August, 1919 65,090

British Rainfall.—While the arrangements for the co-ordination of the two services have been under consideration the Treasury has sanctioned the acquisition by the Director of the Meteorological Office of the British Rainfall Organization which utilised the observations of upwards of 5,000 observers, most of which are municipal or voluntary.

That adds £1,000 per annum to the estimated expenditure and has entailed the payment of a capital sum of £5,595 11*s.*, of which £5,584 6*s.* has been advanced by the Treasury from the grant in aid of the Meteorological Office.

Atmospheric Pollution.—A sum of £500 is included in the estimates of the Office on account of atmospheric pollution.

The estimated annual expenditure which has to be co-ordinated in one estimate is therefore—

	£
Meteorological Office	54,000
Meteorological Service of the Air Ministry	65,090
British Rainfall Organization	1,000
	120,090

Provision has further to be made for the capital sums—

£	s.	d.		
5,595	11	0	... ...	Purchase of British Rainfall.
13,163	5	2	... ...	M.O. Stock of Instruments.
3,503	2	7	... ...	„ „ „ on order.

For the former (of which £5,584 6*s.* has been advanced out of the grant in aid) the Treasury (letter 12685/19) "are prepared to present a supplementary estimate to Parliament in due course for the provision of the necessary funds." For the latter which is carried in the current account no provision has yet been made.

Co-ordination.—In dealing with this question it is necessary to remark that originally the services did not overlap, the lines of demarcation were reasonably distinct. The Meteorological Office maintained its observatories for general meteorological and geophysical purposes, its voluntary stations and its marine and colonial work for meteorological, climatological and economic purposes and its telegraphic reporting stations in association with its observatories for the preparation of information to be collected in London and issued in the form of data or maps or reports or forecasts by post or by telegraph to the public or (during the war) to the several units with the forces, or to those of the Naval Air Service, or subsequently the Meteorological Service of the Air Ministry.

Its primary function was to *collect*, meteorological information of all kinds and distribute it from the Central Office. Its only local centre for distributing information was an establishment at South Farnborough. On the other hand the primary function of the units of the Naval Air Service or of its successor the service of the Air Ministry, as well as that of the Meteorological Section R.E. was *distributive*. Their business was to give advice to the officers of the Naval Airships, the Royal Flying Corps or the Army (Artillery, Gas Companies or Sound Ranging) based upon the information received from the Central Office supplemented by that obtained locally.

We have thus two aspects of meteorological services (1) the *contributive or collective aspect* which was focussed in the Central Office and (2) the *distributive aspect* which was provided for by a local staff of expert meteorologists who could discuss the local conditions in relation with the general situation and give advice accordingly on specific questions. Where the local units should be placed depends upon the services to be rendered.

Similarly there are two aspects of the British Rainfall Organization, first the collection of observations from a multitude of observers, the compilation of tables and statistics and, secondly, the application of the accumulated knowledge to water supply and other economic questions. In the past these have been kept separate; the one part being regarded as scientific, the other as professional. These two aspects still persist and are characteristic of all meteorological institutions. The overlapping between the Meteorological Office and the Air Ministry which has now to be remedied arose from the fact that the forty stations which were set up by the Naval Air Service, for the assistance of airships particularly, were distributed all round the coasts very much as the telegraphic reporting stations were, and could supply information similar to that derived from the telegraphic stations of the Meteorological Office. If they had been permanent they would certainly have been employed instead of the Telegraphic Stations. For meteorological purposes the substitution of one station for another is always preceded by a comparison of the data obtained from the two stations extending over several years. The stations of the Office cost less than £1,000 a year, those of the Air Service being *distributive* at least £20,000 a year. They were able to add, however, observations of the upper air, clouds, visibility, &c., which were useful to the Air Service and should have been communicated to the Central Office as part of the common stock of information belonging to the State, but instead of that the Head Quarters of the Meteorological Service of the Air Ministry developed what had at least the appearance of a rival establishment in that particular department of meteorological work which is concerned with the Daily Weather Service.

One of the reasons given for this action was that the Meteorological Office paid little attention to the study of the upper air and its facilities for the study of it were inadequate. That is a misconception. The statement was probably made in ignorance of the fact that on the basis of its work before the war the scientific staff of the Meteorological Office has made more effective contributions to our knowledge of the structure of the upper air than any other official establishment in any country in the world. The scientific staff employed, with the exception of Mr. W. H. Dines, F.R.S., were comparatively young, because that part of the enterprise was novel and after some years' experience of the working of the Office Colonel Lyons reported to the Committee that "the numbers were insufficient to carry out the work, the salaries were low and the prospects inadequate." That has been recognised in the Office for a long time. It arose mainly from the fact that the scientific staff had to be trained in the Office itself and were young men, or in the case of Mr. Dines preferred an honorarium to a formal salary.

In making estimates for the co-ordinated service it is necessary—

(1) To keep in view the two aspects of the service, to provide enough contributive stations to meet the requirements of an efficient Daily Weather Service, and to maintain distributive stations at aerodomes indicated as necessary by the authorities of the R.A.F. and Civil Aviation. In some cases it is also necessary to provide for instruction in the elements of meteorology.

(2) To take care that the service is not again subjected to any disparagement on the ground that it does not pay adequate attention to the study af the upper air.

(3) To see that the pay of the staff is not so much below the pay of the scientific staff in other departments as to excite remarks from any one who looks into the matter.

Many of the stations established by the Naval Air Service which were at out-of-the-way parts of the coasts have been abandoned because they are not associated with recognised air routes. I have, therefore, taken provision for additional upper air work at Benson, Valencia and Aberdeen observatories and at Holyhead (in place of Llangefny) at Scilly or Falmouth (in place of Mullion), at Lerwick, leaving out for the present corresponding provision at Malin Head, another station in Ireland, Castlebay (Western Hebrides), Pembroke, Jersey, and a Meteorological Station at Ascension.

As regards the distributive stations for the R.A.F. and Civil Aviation, I work upon a list of 20 stations on Air Routes, selected by a conference of the authorities of R.A.F. and Civil Aviation, and suggest the staffing on the R.A.F. side of

Grain (in association with Shoeburyness),
Andover,
Calshot,
Howden,
Felixstowe,
Cranwell,
Cattewater,
Orkney,

and on the Civil Aviation side of

Hounslow or Waddon,
Lympne,
Didsbury,
Baldonnel.

Further, I propose to remedy the overlapping by providing a single effective staff at Headquarters for the forecast service and to augment the small provision at present made at Edinburgh, to meet the repeated representations of the Scottish Meteorologists.

For the Army Services staff is provided at Shoeburyness, West Lavington and Porton with a Superintendent at the Central Office part of whose time will be otherwise occupied.

The Marine work should be supplemented by the appointment of Meteorological Officers at the largest ports which is necessary for the proper supervision of the system of observations by wireless from the Atlantic, which it is proposed to revive, and for other purposes of Marine Meteorology.

The work of British Rainfall and the Investigation of Atmospheric Pollution is included in the general scheme.

The basis of *commencing* salaries of the several grades inclusive of War Bonus are as follows :—

Director £1,500

Professional Staff—	£	*Technical and Clerical Staff*—	£
Assistant Director	850	Principal Assistant	330
Superintendent	650	Staff Assistant	270
Assistant Superintendent	500	Technical Assistant or Clerk Assistant	150
Senior Professional Assistant ...	375	Boy Clerk (approx.)	105
Junior Professional Assistant ...	250		

It is understood that the professional salaries are to be revised in accordance with the conclusion of the Committee appointed by the Treasury to consider the salaries of scientific staffs in Government services, and that the Technical and Clerical staff will secure consideration in due course.

There is no satisfactory means of forming an estimate of the expenses exclusive of salaries until questions of rent and other establishment charges, payment of postage, telegrams, &c., have been settled. A sum of 25 per cent. of the Meteorological Office salaries covers the other expenses, including superannuation of the clerical staff. Making that allowance on the total of salaries of the co-ordinated staff we have the following estimate for a year's expenses :—

	£	£
Salaries		85,193
Other expenses, including superannuation of clerical staff, rent, fuel, lighting, postage, telegrams, telephones, incidental expenses, 25 per cent. of salaries		21,298
		106,491
Less appropriations in aid—		
M.O.	2,384	
British Rainfall	750	
		3,134
Total		£103,357
		or £283 per day.

Some allowance is required for the fact that the salaries of new appointments have been taken at the commencing rates, whereas the seniority of demobilised meteorological officers retained in the service should date from the time of their commissions as meteorological officers with an increase of £25 for Junior Professional Assistants or £15 for Seniors for each year of service. Set against this there is the fact that not all the appointments can be filled forthwith. It will take some time to get the full establishment in working order.

If the salaries and other expenses of the co-ordinated service be debited against the Meteorological Office account as from a certain day, we may arrive at the sum necessary to finance the service for the current year as follows :—

Expenses of Meteorological Office up to the date of transfer	£140 a day	$\frac{£54,000}{365}$
Expenses after the date of transfer	£283 a day	$\frac{£103,367}{365}$
Increase required	£135 a day.	

If the date of transfer be 22nd November, 131 days of the financial year remain. The additional sum required will be 131 × £135, or £17,285.

There would be required in addition to the fourth instalments of the grant in aid of the Meteorological Office :—

£5,595 11*s.* for British Rainfall capital $\left(\frac{234}{365} \times £5,500\right) = £3,526$ for war bonus.

The question of the stock of instruments standing at £13,163 5*s.* 2*d.* on 30th September must be dealt with. Allowing for the balance, £4,396 5*s.* 2*d.*, and superannuation £1,976 8*s.* 6*d.*, which represent internal liabilities, the sum of £6,790 is required in order to make good the cash account.

The subject has already been brought to the notice of H.M. Treasury, who agreed that a market for the stock could only be created by the Meteorological Office itself. They therefore deferred the final consideration of the subject to the end of the financial year (Treasury letter 25364/19). In the meantime it is very desirable to bring the cash book account into much closer agreement with the assets and liability account by discharging the greater part of the liabilities to sundry creditors who are chiefly the Instrument makers and the Post Office. It would require a sum of £10,000.

Meteorological Office,
10th November, 1919.

NOTE.—The figures for corresponding valuation of instruments in stock in the past are :—

	£	*s.*	*d.*
30th September, 1919	13,163	5	2
31st March, 1919	10,534	2	11
„ 1918	3,205	6	8
„ 1917	717	1	7
„ 1916	444	1	2
„ 1915	380	13	2
„ 1914	420	19	5

*Co-ordinated Meteorological Service Salaries.**

Assistant Director.	Superintendent.	Assistant Superintendent.	Senior Professional Assistant.	Junior Professional Assistant.	Principal Assistant.	Staff Assistant.	Technical or Clerk Assistant.	Unclassified, Boy or Girl Clerk, &c.	TOTAL.
—	—	—	—	—	—	—	—	—	—
—	1	—	1	—	—	—	—	—	2
—	—	—	2	2	—	2	16	—	22
—	1	—	1	—	1	2	5	2	12
—	—	—	3	—	—	—	2	—	5
1	1	3	7	6	1	3	13	19	54
—	1	—	1	—	—	—	2	—	4
—	—	5	7	5	—	11	44	—	72
—	1	—	1	1	—	1	4	—	8
—	—	—	2	—	—	2	6	—	10
1	2	1	5	4	3	7	11	12	56
—	1	—	—	1	1	—	1	4	8
—	1	—	—	1	—	—	—	1	3
2	1	4	9	1	4	8	17	32	78
—	—	—	—	—	—	—	—	—	—
—	1	—	2	2	—	1	4	1	11
—	—	—	—	—	3	3	7	15	28
4	11	13	41	23	13	40	132	86	363

	£
Director	1,500
Personal Staff	1,025
Army Services	4,282
Marine	3,277
Port Officers	1,425
Forecasting Distributive Centres H.Q.	13,543
Distributive Centres H.Q.	1,325
Do. (England, Wales, Ireland) ...	15,645
Do. (Scotland, Edinburgh H.Q.) ...	2,145
Do. (Scotland, country)	2,190
Contributive Centres S.K.	10,871
Rainfall Organization	1,910
Atmospheric Pollution	480
Observatories	16,166
Telegraphic Reporting Stations ...	1,000
Malta (day duty only), including housing allowance	3,779
Administration and Accounts	4,627
	85,193

With regard to the capital expenditure necessary for the establishment of the various stations the Director reported that meteorological huts were required at Andover, Scilly, Lerwick, Didsbury, Orkney, Holyhead and Hounslow, and that the cost of a hut was

* Note the establishment submitted to the Treasury A.M. letter 171843/20 is as follows :—

Meteorological Office Establishment.

	Assistant Director.	Superintendent.	Assistant Superintendent.	Senior Professional Assistant.	Junior Professional Assistant.	Principal Assistant.	Staff Assistant.	Technical or Clerk Assistant.	Mechanical Assistants, Unclassified Clerks, &c.	Total.
1. DIRECTOR.										
Director's Personal Staff	—	—	—	1	—	—	—	—	—	1
Marine	—	1	—	1	—	1	2	6	2	13
Forecasting Distributing Centres.	1	1	3	8	6	3	3	10	17	52
Distributive Centres H.Q.	—	1	—	—	—	—	—	2	—	3
Contributive Centres H.Q.—	1	—	—	—	—	1	—	—	—	2
Statistics	—	1	1	4	3	1	5	7	8	30
Instruments ...	—	1	1	1	1	1	3	5	4	17
Rainfall Organization.	—	1	—	—	1	1	1	2	3	9
Atmospheric Pollution.	—	1	—	—	1	—	—	—	1	3
Administration and Accounts.	—	—	—	—	—	3	3	8	16	30
Scotland, Edinburgh H.Q.	—	1	—	1	1	—	1	4	—	8
Contributive Stations—										
Kew	1	—	—	2	1	1	1	1	8	15
South Farnborough	—	—	1	2	—	—	—	4	2	9
Falmouth	—	—	—	—	—	—	1	—	1	2
Benson	1	—	1	—	—	—	1	1	3	7
Holyhead	—	—	—	1	—	—	1	—	2	4
Scilly...	—	—	—	1	—	—	1	—	2	4
Valencia	—	—	1	1	—	1	—	3	4	10
Aberdeen	—	—	1	—	—	1	—	4	1	7

	Assistant Director.	Superintendent.	Assistant Superintendent.	Senior Professional Assistant.	Junior Professional Assistant.	Principal Assistant.	Staff Assistant.	Technical or Clerk Assistant.	Mechanical Assistants, Unclassified Clerks, &c.	Total.
Contributive Stations (continued)—										
Eskdalemuir ...	—	1	—	1	—	1	2	2	6	13
Lerwick	—	—	—	1	—	—	1	—	2	4
Distributive Stations—										
Hounslow	—	—	—	1	—	—	1	3	—	5
Lympne	—	—	—	1	—	—	1	3	—	5
Felixstowe	—	—	—	1	—	—	1	3	—	5
Grain...	—	—	—	1	—	—	1	3	—	5
Andover	—	—	1	1	1	—	1	5	—	9
Calshot	—	—	—	1	—	—	1	3	—	5
Howden	—	—	1	—	1	—	1	4	—	7
Cranwell	—	—	1	—	1	—	1	5	—	8
Didsbury	—	—	—	1	—	—	1	3	—	5
Cattewater	—	—	1	—	1	—	1	5	—	8
Baldonnel	—	—	1	—	1	—	1	5	—	8
Orkney	—	—	—	1	—	—	1	3	—	5
Malta...	—	1	—	3	2	—	2	3	—	11
Army Services E.Q. ...	—	1	—	—	—	—	—	—	—	1
Shoeburyness ...	—	—	—	1	1	—	1	11	—	14
West Lavington ...	—	—	—	1	1	—	1	7	—	10
Marine Officers—										
Felton	—	—	—	1	—	—	—	—	—	1
Glasgow	—	—	—	1	—	—	—	1	—	2
Liverpool	—	—	—	1	—	—	—	1	—	2
Admiralty	—	1	—	2	—	—	—	—	—	3
Proposed Establishment.	4	12	14	43	23	15	42	127	94	374

estimated at from £200 to £400. He estimated therefore that a capital expenditure of at least £1,000 would be necessary on this account.

The attention of the Committee was also drawn to the fact that additional accommodation would be required at the Observatory at Eskdalemuir.

It was agreed that the question should be taken up after the present financial year.

Thunderstorm Inquiry.—The Director asked for provisional authority for the expenditure of £1,720 for providing huts and apparatus at four stations in connection with the inquiry into the location of thunderstorms by directional wireless.

Authority was given for such expenditure if such expenditure could be met and the necessary authority obtained from the Air Ministry.

Requisition from Director of Research for Personnel and Apparatus required for Research in Aerial Navigation.—Read—a letter M.O. 16014 from the Director of Research, stating that for the development of research in aerial navigation the Directorate would require very accurate information regarding wind force and direction at various heights along certain definite routes radiating from Biggin Hill, and asking that allowance for these requirements should be made in drawing up the establishment.

The Director reported that he had communicated with the Director of Research on the subject.

Other Researches.—Reported—that six rangefinders of the latest pattern had been obtained from the War Office (Minute 804), and that it was proposed to send these to the various observatories connected with the Office for experiments on the distance and height of pilot-balloons.

It was proposed to send them for trial to the observatories at Kew, Eskdalemuir, Valencia, Benson, Aberdeen, and another to be selected when staff had been obtained for the aerodrome stations.

The question of the meteorological requirements for Scotland was discussed (Minute 796), and Dr. Wedderburn agreed that the suggested provision for personnel at Edinburgh would meet the present needs of a central establishment for a Scottish service.

It was agreed that the appointment of the Superintendent should be postponed for further consideration.

Reported—that the Marine Superintendent had asked for the retention of the services of Mr. **H. Harries** (Minute 765), due for superannuation on 31st December, 1919, under Treasury Letter 35815/19 (Minute 801), in order to carry on the work of the division until the new appointments could be made and during the transfer to Kingsway.

It was agreed that the Director be authorised to retain Mr. Harries' services by order, but not beyond 31st March, 1920.

With regard to promotions and appointments to established posts in grades inferior to that of Junior Professional Assistant, it was agreed that the Director should have discretion in the matter, but that the appointments and promotions should be reported to the Committee.

It was agreed that Squadron Leader **Gendle** (Minute 599) be offered the appointment of Assistant Superintendent in the Instruments Division on his return to duty at the Office after demobilisation, that Flight-Lieut. **H. G. Harris** (Minute 599) be appointed Staff Assistant at either Kew or Eskdale Observatory on his return to the Meteorological Office on demobilisation, and that a suitable appointment be offered also to Flight-Lieut. **Guy Harris.**

The Director reported that he had received a request for appointment from Lord Dunboyne, formerly in charge of the Admiralty Meteorological Service, but at present there was no suitable vacancy.

812. Office Staff.—**Selections for Appointment.**—The Director submitted the following provisional proposals for promotion and new appointments, subject to the sanction of the Treasury being obtained to the proposed establishment:—

1. That the salary of **Dr. C. Chree** (Minute 754), as Assistant Director at Kew Observatory, with special reference to geophysical subjects, be increased from £800 to £850 as the sum provisionally assigned for the commencing salary of an Assistant Director.

2. That the following Senior Professional Assistants be appointed Assistant Superintendents with a salary of £500 per annum: **R. Sargeant** (Minutes 654 and 754), **E. G. Bilham** (Minute 754), **E. V. Newnham** (Minutes 623 and 754), as being senior officers in charge in the Forecast Division, and responsible for the issue of information on behalf of the Office; **C. E. P. Brooks** (Minutes 654 and 754), as being in charge of the work of the Réseau Mondial; **R. A. Watson Watt** (Minutes 647 and 754), as Meteorologist-in-Charge of the Office at South Farnborough, and responsible for the work on the location of thunderstorms by directional wireless; **L. H. G. Dines** (Minute 754), as being in charge of the Observatory at Valencia, Cahirciveen.

3. That **A. E. M. Geddes** (Minute 745), late Captain, R.E., who received a commission in 1915 for meteorological work in France and remained throughout the war, at present Assistant to Professor Niven at the Observatory, Aberdeen, be invited to accept a post as Assistant Superintendent at a salary of £500 per annum, to take charge of an upper air station at Aberdeen.

Revision of Circular 002.—It was agreed that a revision of Circular 002 had become necessary, and the Director undertook to prepare a draft.

Superannuation (Minute 801).—Reported—that in accordance with Treasury letter 35815/19 of 15th October the following amounts would be payable by way of pension to the members of the staff who had been retained during the war :—

Mr. F. J. Brodie, £187 10*s*.
Mr. H. Harries, £187 10*s*. + £10. £197 10*s*.
Mr. W. G. James, £137 10*s*.
Mr. J. Sheerman, £156 10*s*
Mr. R. F. Wallace, £148 17*s*. 6*d*.
Mr. T. D. Bell (due to retire 31.3.20) £187 10*s*.

Reported—the receipt of a letter from Mr. H. Harries asking that his pension be increased to £250 per annum, and from Mr. J. A. Curtis, Cashier, asking for a readjustment of his salary consequent upon Treasury letter 35143/19 (M.O. 12552).

It was agreed that the question of superannuation allowances, and of the points raised in Mr. Curtis' letter be taken up with the financial authorities, and that effort should be made to obtain favourable terms for the members of the staff concerned.

813. Advisory Committee on the Investigation of Atmospheric Pollution (Minute 806).—Reported—that a letter (A. 19526/C.G.C.A. 10.A) had been sent to the Department of Scientific and Industrial Research asking that the Department would make provision for the research into Atmospheric Pollution on current lines for the current year.

Submitted—the following letter and enclosure from the Secretary of the Department of Scientific and Industrial Research.

5632/19.—M.O. 16013.

Scientific and Industrial Research Department,
15, Great George Street,
Westminster, S.W.1,
20th November, 1919.

Sir,

I am directed to refer to the application from the Meteorological Committee for a renewal of the grant in aid, for the year ending 31st March, 1920, of the Research into Atmospheric Pollution. I am to say that arrangements have been made with the Air Ministry for provision for this investigation to continue to be made by this Department pending the completion of the arrangements for the transfer of the Meteorological Office to the Air Ministry.

I am, therefore, to inform you that in accordance with arrangements approved by the Committee of the Privy Council for Scientific and Industrial Research, it has been decided to make for the year ending 31st March, 1920, a grant in aid not exceeding £474 for the investigation of atmospheric pollution. The figure of £474 has been arrived at by deducting from the total estimated expenditure for the period of grant, £635, the balance of £160 19*s*. 3*d*. which is shown by the statement of accounts on Form 5A for the year ended 31st March, 1919, as remaining, deducting the outstanding accounts owing by the maintaining body. The grant will be subject to the conditions set out on the enclosed schedule which are practically the same as those attached to the previous grant, being only modified so far as is now necessary by the circumstances of the case.

With regard to Clause 7, I am to state that the proposed honorarium to the Secretary of the Advisory Committee of £100 for the current financial year has the approval of the Advisory Council.

One half of the grant will be paid to the Director, Meteorological Office, South Kensington, S.W.7, as soon as this Department has been informed of the acceptance of the conditions attached to the new grant. The second half will be paid on 1st January, 1920. Any balance of grant remaining unexpended on the transfer of the Meteorological Office to the Air Ministry will be repaid to the Department.

With regard to Clauses 10 and 11 of the conditions, I am to ask whether Dr. Owens is still to be responsible for reporting the results of the research to the Advisory Council.

I am, &c.,
S. LLOYD.

COMMITTEE OF THE PRIVY COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

CONDITIONS APPLYING TO THE GRANT-IN-AID OF THE INVESTIGATION INTO THE POLLUTION OF THE ATMOSPHERE.

1. The investigations will be directed by the Advisory Committee to the Committee of the Meteorological Office. The Advisory Council for Scientific and Industrial Research reserve the right to appoint a representative on the Directing Committee.

2. The Committee of the Meteorological Office will secure that the number of local centres in which investigation into the pollution of the atmosphere is carried on, under the supervision of the Directing Committee, shall not fall below the number of such centres existing on 1st January, 1917; and will be responsible for securing that the cost of the gauges used in these local centres, and the analyses for local purposes of the results obtained, will be borne by the Local Authorities interested.

3. The Advisory Committee will take suitable steps to secure that the arrangements for tests at the local stations are periodically inspected.

4. A further grant of £474—*i.e.*, £635, less the balance of the previous grant amounting to £160 19*s.* 3*d.*, which was unexpended on 31st March, 1919—will be paid to the Meteorological Office towards—

(*a*) the cost of maintaining a station in London as a central station under the immediate supervision of the Advisory Committee, and the cost of supervising, compiling, collating and discussing the results obtained at the local centres and the control station, and

(*b*) the cost of the experimental investigation of methods of filtration of air with the object of securing a satisfactory means for recording the amount of impurity carried in the air,

(*c*) the cost of publication of the Report of the Committee for the Investigation of Atmospheric Pollution.

The Committee of the Meteorological Office will keep a separate account of the receipts and payments in respect of the work of the investigations.

5. Any plant, apparatus, instruments, or other equipment provided for the purpose of the investigations by the Committee of the Meteorological Office will be entrusted to the Committee of the Meteorological Office; but the Department of Scientific and Industrial Research reserves the right to determine, in consultation with the Advisory Committee and the co-operating bodies and persons, the ultimate disposal of such plant, apparatus, instruments, and other equipment.

6. If it is proposed to charge to the cost of the Research any sum paid to any salaried official of a Public Educational Institution the facts should be submitted to the Committee of Council beforehand, with information as to whether the proposal has received the approval of the Governing Body of the Institution.

7. If it is proposed to make to any member or officer of the Advisory Committee a payment of the nature of a salary, fee, or honorarium the facts should be submitted beforehand to the Committee of Council for approval.

8. The Advisory Committee will submit for the period ending 31st March, 1920, or on the date, if earlier, of assumption of financial responsibility by the Air Ministry, audited accounts, together with a report on the progress of the investigation: these documents should be forwarded as soon as possible after the end of the period of grant.

The Report should give particulars of any plant, apparatus, instrument, or other equipment provided by the Committee of the Meteorological Office for the purpose of the investigation during the period covered by the Report.

9. If the total expenditure on the investigations for the year ending 31st March, 1920, or until the date of the assumption of financial responsibility by the Air Ministry, is less than the estimated expenditure, the balance of grant will be returned to this Department.

10. The results of the investigation as obtained from time to time shall, in the first place, be communicated to the Committee of Council who, after consultation with the bodies and persons who have co-operated in the conduct and maintenance of the research, shall determine in the national interest whether and, if so, to what extent and under what conditions, the results shall be made available.

11. The Committee of Council reserve the right to determine, after consultation with the bodies and persons who have co-operated in the conduct and maintenance of the research, whether and, if so, to what extent and in what proportions the Committee of Council and those bodies and persons shall secure to themselves by patent, designs, or otherwise the ownership of the results of the research and any benefits and profits arising therefrom.

12. If any question arises as to the interpretation of these conditions, the decision of the Committee of Council shall be final.

APPENDIX.

Membership of the Advisory Committee.

Sir Napier Shaw, F.R.S., Director of the Meterological Office (*ex-officio*) (Chairman). Captain C. J. P. Cave (Past President of the Royal Meteorological Society). Mr. J. G. Clark, F.I.C. Professor J. B. Cohen, B.Sc., Ph.D., F.R.S. (Professor of Organic Chemistry, Leeds University). Dr. H. A. Des Voeux (Hon. Treasurer, Coal Smoke Abatement Society). Dr. J. S. Owens (Coal Smoke Abatement Society). Dr. E. J. Russell (Director of the Rothamsted Experimental Station, Harpenden). Bailie W. Smith (Member of Departmental Committee on Smoke Abatement). Mr. S. A. Vasey, F.I.C., F.C.S. (Director of the Lancet Laboratory). Mr. F. J. W. Whipple (Superintendent of the Statistical Division, Meteorological Office).	Appointed by the Meteorological Committee.
Dr. John Robertson, nominated by the Corporation of Birmingham. Dr. W. Hanna „ „ „ of Liverpool. Dr. W. J. Howarth „ „ „ of the City of London. Mr. Henry Mills, J.P. „ „ „ L.C.C. Mr. W. Osborne Thorp „ „ „ of Malvern. Professor W. Haldane Gee „ „ „ of Manchester. Mr. C. T. Stableforth, J.P. „ „ „ of Newcastle-on-Tyne. Dr. J. B. Wilkinson „ „ „ of Oldham. Dr. J. R. Ashworth „ „ „ of Rochdale. Dr. Cates „ „ „ of St. Helens. Mr. John Fyfe „ „ „ of Stirling.	Appointed by the Municipal Authorities contributing Observations.
Mr. W. S. Curphey, Chief Alkali Inspector of the Local Government Board.	Appointed by the Advisory Council for Scientific and Industrial Research.

It was agreed that the conditions set out in the enclosure as regulating the grant be accepted.

814. OBSERVATORIES AND STATIONS.—**Co-operation of Grain and Shoeburyness** (Minute 804).—Submitted—the following letter (File A 40636) from the Superintendent of Experiments at Shoeburyness:

Controller, Meteorological Office,
Air Ministry.

AT the last meeting of the Meteorological Committee I gathered that it was contemplated to instal a Meteorological Station on a large scale at the Grain Island Aerodrome.

Before this matter goes any further I would ask the Committee on behalf of the War Office, whose representative I am, to consider the advisibility of installing this Station at Shoeburyness instead of at Grain.

Shoeburyness is less than 5 miles from Grain Island so that meteorological conditions are practically the same in both places.

My reasons for this request are as follows:—

(i) A moderately well equipped Meteorological Station complete with personnel already exists at Shoeburyness.

(ii) Meteor data are required daily in connection with experiments.

(iii) It is essential that the Meteorological Station shall be in close proximity to the Experimental batteries so that the Meteor: and Experimental Staffs may be in constant direct communication and also that the Meteor: Staff may learn by experience Experimental requirements.

(iv) A great deal of research work is still required in the Science of Meteorology applied to Gunnery (Naval and Military). This work the present Meteor: Staff is always engaged upon when not otherwise employed.

The Superintendent of this Meteor: Section is in frequent communication with the Ballistic officer of the Ordnance Committee and from a gunnery point of view it would be a very retrograde step to remove him from these activities or to reduce in any way his staff or his Meteor: installation. Shoeburyness is the only place where this work is being or can be done, as nowhere else are guns fired daily.

(v) It is not known what Meteor: data would be required by the Grain Island aerodrome, nor how often such data would be called for, but the Experimental Establishment, Shoeburyness, has a *private* direct telephone line to the R.A.F. Headquarters at Grain through the new Experimental firing battery on Yantlet Creek, Grain Island.

(vi) Anti-Aircraft guns and ammunition are available at Shoeburyness, also Mirror Position Finders for the determination of upper air wind movements by means of the smoke from shell bursts, and further the guns are so sighted that they can be fired at all times without danger to shipping or neighbouring inhabitants from falling fragments. Such conditions do not exist at Grain.

I am convinced that a Meteorological Station at Shoeburyness would be more economical, and would meet Naval, Army, and Civil requirements better than the Grain Island scheme. I would go further and suggest that it be the best equipped station for research work in Meteorology and be used also for experimental work in connection with improved meteorological instruments. It is readily accessible from London by train and the telephone service to London is good.

H. A. LEWIS, Lieut: Colonel,
Superintendent of Experiments.
W. O. Member Meteorological Committee.

Shoeburyness.
15th November, 1919.

Reported also—a Minute (A. 40636 Min. 4.) from the Assistant Director in charge of Forecasting and Distributive Stations stating that Grain was one of the research stations under General Brooke Popham, and also one of the stations from which reports would be required for providing satisfactory weather information on aerial routes, and that as communication by wireless was essential, if the wireless had to be at Grain the meteorological personnel must also be at Grain.

Colonel Lewis reported that a private wire between Grain and Shoeburyness had been installed which was at the disposal of the Meteorological Staff.

Approval was given to the establishment of as full a station as possible at Shoeburyness, though it would still be necessary to rely upon Grain for the provision of upper air temperatures by aeroplane. It was further agreed that economy by co-operation with Grain should be made as effective as possible.

Provision for apparatus at Distributive Stations for locating thunderstorms by Directional Wireless.—Reported—the receipt of a Minute from the Assistant Director in charge of Forecasting pointing out the necessity for the provision at each of the local centres for the different areas (9 stations in all) of one of Watt's thunderstorm recorders to make an autographic record and to give the usual aural indication in addition ; and also at each of the Sub-centres or aerodromes where professional Staff are required (11 stations) of thunderstorm direction apparatus with aural indicator only.

815. PUBLICATIONS.—Authority was given for the following publications :

Percentage Wind Frequencies at various Altitudes in Macedonia by Captain E. Kidson, as a Geophysical Memoir.

Meteorological log for cadets in training ships and establishments of the Mercantile Marine.

The question of the publication of a **Climatological Atlas** (Minutes 607 and 315) in conjunction with the Royal Meteorological Society was discussed, and the Director agreed to submit a memorandum on the subject.

Proofs of the following were laid on the table :—

M.O. 220*e*. **Geophysical Memoirs No. 15.**—The Climate and Weather of the Falkland Islands and South Georgia by C. E. P. Brooks.

M.O. 236. **The Book of Normals** of Meteorological Elements for the British Isles for periods ending 1915 Section I. Temperature, Rainfall and Sunshine.

816. DIRECTOR'S REPORT AND ACCOUNTS :—

Removal of Headquarters to Air Ministry, Kingsway.—Reported—the transfer from South Kensington of the undermentioned sections, and the establishment at the Air Ministry of a separate Meteorological Office Registry.

The headquarters of the Army Meteorological Services were transferred to Kingsway on 21st October 1919 (Order No. 915).

The removal of the Forecast Service was effected on Tuesday, 18th November 1919. The daily weather service was maintained without interruption, the work at Kensington concluding at 1 p.m. on the 18th with that upon the 7h. observations, and the work at Kingsway commencing at 1 p.m. with the preparation of the map from the 13h. observations. (Order No. 928). The records of the daily weather service including bound volumes of working charts since the beginning of the service and British and Foreign Daily Weather Reports were transferred at the same time. The meteorological work of the Air Ministry Meteorological Service was taken over as from 9 p.m. on 21st November.

The Accounts Section and Director's Secretary were transferred on Thursday, 20th November 1919, together with the principal Registry records, and such of the correspondence of the previous 10 years as related to the work transferred. (Order No. 933). The Registry records, correspondence, and furniture &c., at Kensington were sorted, packed and labelled between 5 p.m. and 9 p.m. of the previous day, and the portion intended for removal was removed from the Registry there. The staff at Kensington were thereby enabled to maintain complete Registry services without interruption until the new Registry at Kingsway notified its ability to undertake the separate responsibilities of the new establishment.

A regular service between the two offices by Air Ministry Despatch Rider has since been arranged and is now in operation.

It is proposed to move also the Marine Division provisionally into four of the rooms at present occupied by the Meteorological Service of the Air Ministry if they can be placed at the disposal of the Meteorological Office for the purpose, and to find accommodation for the Meteorological Service of the Admiralty in conjunction therewith. It will then be possible to find room in the main building at South Kensington for the Instruments Division and to surrender the occupation of 15, Cromwell Road now occupied by that division.

International Co-operation.—Prof. V. Bjerknes, president of the International Commission for the study of the upper air, visited the Office on November 1 to make arrangements for the collection of all available material for the study of the upper air dependent upon observations taken by the Meteorological Service during the war. Dr. F. Nansen visited the Office on November 28th to discuss the investigation of the relation of sea-temperatures to other meteorological elements and spent a morning with Mr. Brooks discussing the available data.

Royal Society Medal.—At the Anniversary Meeting of the Royal Society on 1st December, 1919, the Hughes medal was awarded to Dr. C. Chree, Assistant Director at Kew Observatory for his work on Terrestrial Magnetism.

Meetings for Discussion.—The subjects of discussion were: on 17th November, B. Helland-Hanson and F. Nansen "Variation of Temperature of the N. Atlantic Ocean and in the Atmosphere;" on 1st December, W. H. Gregg "Aerological Investigations of the Weather Bureau during the War."

Reported—The death of Miss Juliet C. Hepworth. She had been receiving a pension from the Civil list since April, 1919. (Minute 754.)

Accounts.—Submitted—The following statement of Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on 4th Nov., 1919	8,432	14	6
Receipts from 5th Nov., 1919	767	8	8
	9,200	3	2
Cheques drawn from 5th Nov., 1919	6,113	10	9
Bank Balance on 2nd Dec., 1919	£3,086	12	5

Travelling Expenses.—Authority was given for the payment of a subsistence allowance of £2 a day in addition to travelling expenses, in all £26 4*s.* 2*d.* incurred by the Director during his visit to Paris, September 28th–October 7th to attend the International Meteorological Conference.

Daily Weather Report.—Submitted—the following Director's Order for confirmation. Order 908 increasing the subscription for two or three copies of the Daily Weather Report to £2 per annum, in consequence of the increase in the charge for postage of printed papers.

HUNDREDTH MEETING.

Air Ministry, W.C. 2, 28th January, 1920.

PRESENT :

THE PRESIDENT, IN THE CHAIR.

THE DIRECTOR OF THE METEOROLOGICAL OFFICE.

MR. FLOOD.	MR. MCANALLY.
CAPT. HARVEY.	SIR THOMAS MIDDLETON.
THE HYDROGRAPHER.	MR. MEADOWCROFT.
COLONEL LYONS.	SIR ARTHUR SCHUSTER.

DR. WEDDERBURN.

MR. BERTRAM was in attendance.

817. The Minutes 796–807 of the Meeting of 5th November, 1919, previously circulated in revise, were taken as read and with certain modifications confirmed.

The Minutes 808–816 of the Meeting of 3rd December, 1919, previously circulated in proof, were corrected and ordered for revise.

818. CORRESPONDENCE.—**Royal Society.**—*Appointment of Colonel Lyons and Sir Arthur Schuster* (Minute 796).—Read—a letter M.O. 16,510 (B 11,304) from the Royal Society stating that the President and Council at their meeting on 11th December had appointed Professor A. Schuster, F.R.S., and Colonel H. G. Lyons, F.R.S., to serve as their representatives on the new Meteorological Committee under the Air Ministry.

Scottish Office.—*Representation of Scotland on the Committee* (Minute 80[illegible]).—Read—the following letter :—

B. 11,304.—23,351/9.

Scottish Office,
Whitehall, S.W.1.
1st December, 1919.

SIR,

WITH reference to your letter (B. 11,304 (C.G.C.A.)) of the 14th November, regarding the constitution of the Meteorological Committee, I am directed by the Secretary for Scotland to state, for the information of the Air Council, that he notes with satisfaction the action proposed to be taken with respect to representation of the Royal Society of Edinburgh on the Committee and to the development of meteorological work in Scotland. The purport of your letter has been conveyed to the Royal Society of Edinburgh, with a suggestion that the name of the Society's representative should be communicated to yourself and to this Office.

I am to explain that the letter from this Office of the 4th November was intended to suggest that Scottish Departments as well as the Royal Society of Edinburgh should be represented on the Meteorological Committee. Mr. Munro attaches importance to this in view of the interest which a number of Scottish Departments have in the organisation and application of meteorological work. He appreciates the difficulty which the Ministry may have in adding unduly to the size of the Committee, and for the present, at any rate, he would be content to ask for only one official representative, who would keep in touch with, and speak for the various Departments concerned. He trusts that the Air Ministry will be prepared to agree to this request, and in that event steps will be taken to select an official representative.

I am, &c.,
JAMES M. DODDS.

The Secretary,
Air Ministry,
Kingsway, London, W.C.2.

The Director pointed out that a Committee was already in existence for administering the grant to the Edinburgh Office, and as an alternative to the suggestion of the Scottish Office it was desirable that this Committee should continue to meet in Edinburgh. It should include representatives of the Scottish departments and consider questions concerning meteorological work in Scotland.

It was agreed that it is not desirable further to increase the membership of the Meteorological Committee, but that any special interests might be represented on occasions if necessary.

Scottish Board of Health.—Reported—the receipt of a letter M.O. 25,228 from the Scottish Board of Health, under cover of a letter from the Scottish Office, asking that the

Meteorological Office should send a representative to attend a Conference to be held on 27th January, on the question of the continuance of certain telegraph and telephone lines in the North of Scotland erected by the Admiralty during the war.

The Director reported that he had asked Dr. Wedderburn, the Scottish representative on the Committee, to attend the conference as representative of the Meteorological Office.

Dr. Wedderburn submitted the following report :—

I attended meeting and Conference in Edinburgh to-day. A representative of the Controller of Communications, Air Ministry was also present. On the subject of St. Kilda he stated that the Air Ministry intended to ask for Treasury sanction for the establishment of a W/T station at St. Kilda which would be sufficiently powerful to communicate with H.Q. The Conference unanimously agreed to represent that the maintenance of a W/T station on St. Kilda was of the utmost importance. The present station has only a radius of about 100 miles.

None of the other points which arose at the Conference appeared to be of importance from the point of view of the Meteorological Office.

E. M. WEDDERBURN.

2, Glenfinlas Street,
Edinburgh.
27th January, 1920.

The Director pointed out that the question of maintaining a station at an isolated point like St. Kilda was simply one of the allocation of funds. Every additional point eighty miles or more beyond the present western limit is of value and should be made available provided its maintenance does not imply alienating funds from some other point where more effective work could be done. In the case of St. Kilda, if other departments would share the expense, it was at least desirable to make a trial of its effectiveness.

Approval was given to the proposal on these terms.

Scottish Meteorological Society (Minute 767).—*Agreement between Scottish Meteorological Society and Meteorological Committee.*—Reported—the following correspondence :—

M.O. 16,339.

6, Succoth Gardens,
Edinburgh, W.,
7th December, 1919.

DEAR SIR NAPIER,

THERE will be a meeting of the Council of the Scottish Meteorological Society on 19th inst., and I propose to ask authority to make an agreement with the Meteorological Committee on the following lines :—

1. The Society shall cease to be responsible for the collection of statistics and the supply of information to the public, and shall confine itself to the encouragement of research and the stimulation of interest in and the study of Meteorological Science.
2. The collection of statistics and the supply of information to the public shall be taken over by the Meteorological Committee. The Society's staff shall be taken over by the Committee and a branch office shall be opened in Edinburgh.
3. The staff of the branch office shall be allowed to undertake secretarial work for the Society on such terms as may be arranged.
4. The Society shall hand over its library, &c., to the Meteorological Committee to be held and maintained in Trust for the Society subject to the use of the public, and in consideration therefor the Society and its property shall be housed free of expense by the Meteorological Committee.

I will be glad to learn whether you think an agreement on these lines could be come to. Clause 3 may cause some difficulty as the Meteorological Committee may have difficulty in allowing its employees to accept remuneration from another body. Could that difficulty be avoided by the Society contributing, say £50, to the Meteorological Committee ?

I wish to circulate proposed heads of agreement before the Council Meeting, and would be glad of an early reply.

Yours sincerely,
E. M. WEDDERBURN.

M.O. 16,383.

Meteorological Office,
Air Ministry, Kingsway, W.C. 2,
11th December, 1919.

DEAR WEDDERBURN,

WITH reference to your letter of 7th December, I would like to recapitulate that the present position is :—

1. That a committee under the auspices of the Scottish Meteorological Society supervises the staff of the Edinburgh Office appointed to do the general work of the Réseau of climatological stations in Scotland for the Registrar-General of Scotland and the Meteorological Office jointly, and receive therefor £100 a year from the Treasury for the former and £350, plus something for war bonus, from the latter.
2. The Society does the work on Scottish rainfall on its own account.
3. The Superintendent of the Edinburgh Office is allowed to act as Secretary of the Society and receive pay for doing so.
4. The Society pays the rent of the Office and allows the Committee the use of it.
5. The Society retains its library.

What you now propose, therefore, means handing over the rainfall work and the library and saving for the Society the rent of the Office, and in return the Meteorological Committee obtains for the public the use of the library and the rainfall organisation.

The work would then be joined up with other weather work for Scotland necessitated by the greater demand for such work, for which provision is already bespoken in the estimate sent in to the Finance Division of the Air Ministry.

On this showing I think the Society will be relieved of the arduous work of dealing with the rainfall for which, under new conditions, the staff will regard itself as deserving payment, and it will also be relieved of the rent and have no expenses except its Journal and the secretarial work in connection with it.

On the other hand it must be said that the work of the Society in respect of rainfall is entirely voluntary, and the Society is under no obligation to continue it.

I raise no objection, therefore, on principle to the proposal which you have set out. How much of it can be carried out depends of course upon the funds which the Government is willing to provide.

On one point I am certainly a little anxious. You will know that my view, and I think the only reasonable view, is that local authorities are the proper bodies to provide the observations of meteorology and rainfall necessary for a proper survey of the climatology of a country. I have some fear that the Local Authorities of Scotland, being less used to extraneous demands than those of England, may adhere to the maintenance of what they think their just rights, to have their local notes of weather made for them by the "Government," even to their own hindrance. In that case I am afraid the world at large would be the loser by the new arrangement, because it is obvious that we could not undertake to work from London or Edinburgh a raingauge in Uist.

If you think that this danger may be averted, a proposal in the terms you mention should, in my opinion, be successful.

Yours sincerely,
NAPIER SHAW.

M.O. 25,556.

2, Glenfinlas Street,
Edinburgh,
19th January, 1920.

DEAR SIR NAPIER,

WITH further reference to my letter of the 7th ultimo, and your reply No. 16,383 of 11th ultimo, I write to report that the proposals which I put before the Council of the Scottish Meteorological Society at their meeting last month (which were those outlined in my letter to you of 7th ultimo) were approved.

I apprehend that when a branch office is opened in Edinburgh the climatological and statistical work will not, to commence with, be very different from the present work done by the Meteorological Office in Edinburgh, and that the question of forecasting is the main one for consideration. I think details as to the information to be collected for forecast purposes in the Edinburgh Office need not be considered until an assistant who is to be responsible for the work has been appointed, and, in any event, details could best be discussed with you and Mr. Gold in Edinburgh. I suggest, however, that, to commence with, only one map be published daily here. I have been making enquiries as to the demand which the public press is likely to make, and find that the "Glasgow Herald" would willingly publish a weather map but that it would be impossible for us to furnish them with an evening map soon enough to make publication possible next morning. The "Scotsman," which is the leading Edinburgh paper, expresses itself content with present arrangements and cannot afford a larger space.

It will, of course, be necessary to prepare an evening working map for office use. I am not clear in my mind to what extent information at present given to the Scottish Press can be supplied from Edinburgh, and I am not aware of the nature of the arrangement made by you with them.

As regards the publication of a daily weather map, I think what we should aim at is something in the nature of the B. Section of the Daily Weather Report. This seems most likely to meet local requirements. Possibly space could be found on it for 6 p.m. of the previous evening on the smaller scale. I imagine such a publication would have a certain demand for educational purposes.

I can form no estimate of the number of maps which it will be necessary to reproduce. Is there any considerable circulation of the Daily Weather Report in Scotland? Perhaps hectograph copies such as were issued in France would meet immediate demands.

Yours sincerely,
E. M. WEDDERBURN.

P.S.—The Office of Works have acquired 122, George Street—I think for the Board of Health. The question of accommodation is, therefore, sharply raised, and should be settled without unnecessary delay.

E. W.

The Director,
Meteorological Office,
Air Ministry,
Kingsway, W.C. 2.

The Director agreed to draw up a scheme, in conjunction with Captain Wedderburn, for the organisation of the Meteorological work of Scotland.

It was further agreed that the Office of Works should be approached with a view to finding accommodation for the Edinburgh Office, as the premises at 122, George Street, now leased for the purpose would have to be relinquished within the next few months.

Director of Research (Minute 811).—*Establishment of meteorological station at Biggin Hill.*—Read—a letter (M.O. 25411) from the Director of Research stating that the requirements of the Directorate would be met by the establishment of a small meteorological station at Biggin Hill.

It was agreed that provision for such a station should be included in the estimates for 1920–21.

819. ORGANISATION.—**Financial Arrangements** (Minute 811).—Read—the following memorandum by Mr. Bland, Assistant Financial Secretary.

ESTIMATES AND ACCOUNTING ARRANGEMENTS FOR THE METEOROLOGICAL SERVICE, 1920–1921.

The following points arising out of the transfer of the Meteorological Office to the Air Ministry require consideration in connection with next year's estimates and accounts. Treasury letter of 4th November, 1919, No. 31,348, states that in 1920–21 and subsequent years the expense of the Meteorological Service would be provided in Air Votes and accounted for as a charge against those Votes, *i.e.*, the expense would not be provided for by a lump sum grant requiring a separate appropriation account but would form an integral part of Air Votes and be included in the general appropriation account.

Form of Estimate.

It is proposed to set up a special Vote for Civil Aviation in 1920–21. It is therefore proposed to include in this vote the cost of the Meteorological Service except the salaries, &c., of the Headquarters staff, which will have to be included in Vote 5 as a special item in the estimate for the department of the C.G.C.A. The remaining services would form a special sub-head in the Vote for Civil Aviation and would be built up in the following form :—

* * * * * * *

Malta Meteorological Station.
Salaries ... ... Superintendent.
Senior Assistant, &c.
Instruments, &c.
Running Expenses.

* * * * * * *

Appropriation in aid of Meteorological Services would be included as a separate item in the A in A sub-head of the Civil Aviation Vote.

Grants from Royal Society, &c.

It is understood that the following grants in aid have hitherto been paid to the Meteorological Office.

Royal Society :—£1,000 for expenses of Magnetic Observatory at Eskdalemuir. As this is a Parliamentary Grant provided in Class IV of the Civil Service Estimates it is probable that the provision will be discontinued in 1920–21, and the necessary provision have to be made wholly in Air Votes.

£250—Advisory Committee. This sum is not shewn separately in the Civil Service Estimates but is probably part of the sum of £4,000 for Scientific Investigation provided under Class IV 8A. If so, it may be assumed that the provision of the grant will be discontinued.

Gassiot Trust and Rosse Trust :—There appears to be no reason why these grants should not be continued. As the Committee which administers the Gassiot Trust was appointed by the Treasury, it would be desirable to consult the Treasury before approaching the Royal Society as to the continuance of the grants.

Department of Scientific and Industrial Research :—£500. Atmospheric Pollution This sum is presumably paid out of the grant of £55,000 included in Civil Service Estimates Class IV 9e. The Department of Scientific and Industrial Research have already inquired as to the necessity for continuing the grant now that the Meteorological Office has been transferred to the Air Ministry. (File A19,526.)

Sale of Weather Reports, &c.

It is proposed that these receipts should be treated as appropriations-in-aid.

Purchase of Instruments.

The provision for instruments required for Meteorological Stations would so far as possible be made under the Station Headings in the sub-head, but as the Meteorological Office also makes large purchases of instruments for sale to the Navy, Army, &c., it would be necessary to make provision for such purchases under a general heading in the sub-head. The receipts for such sales would be shewn as appropriations-in-aid.

Accounting.

The Treasury in their letter of the 4th November, 1919, No. 31,348/19 said that provision should be taken for an inclusive sum as Grant to the Meteorological Office in supplementation of the Grant of £47,000 in Class 4 Vote 8B of the Civil Service estimates. This has been taken as meaning that

the "inclusive sum" should cover only expenditure (in excess of the £47,000 provided in the Civil Service estimates) on such services of the Meteorological Office as were in existence at the time of transfer.

Accordingly a sum of £12,000 has been provided in Vote 60 (G) to meet possible charges for war bonus to transferred staff and the cost of the purchase of records of the British Rainfall Association (arranged before transfer).

All the expenses of new establishments and the salaries of persons appointed to the combined meteorological service after the date of transfer will be borne on the appropriate Air Votes and provision for such charges has been made.

Accounting Staff.

The Meteorological Office had an accounting staff of four who have been transferred, and it is considered that it would be convenient if this staff continued to carry on during the remainder of the year in paying the staff already on their books and meeting the normal expenses of those establishments which have been transferred with the Meteorological Office. They should also continue to collect fees due for weather reports, inspections, &c. All new appointments and new services, which, as stated above, will be chargeable to various Air Votes, should be paid for by F.E. on the due authority of the appropriate finance division.

From the 1st April next there will be no division for accounting purposes between the Meteorological Office as it existed before transfer and the new Meteorological Service, and there will, therefore, be no need for the Accounting Section of the Meteorological Office to continue as a separate entity. So far as can be seen, the addition of one second division clerk to the cashier's section of the Air Ministry would be sufficient to carry on the work of paying salaries. The remainder of the work would not, it is thought, justify any further addition, though an absolute promise on this point cannot be given.

It should be stated that this does not imply that the present Accounting Staff of the Meteorological Office is too numerous, because several of their duties will lapse, and others will be spread over a rather large number of clerks.

Imprest Accounts.

There are a certain number of out stations which run small imprest accounts. These in the new year would draw their imprests direct from the Air Ministry, to whom they would account. The accounts could probably be examined by F.P. 3. without trouble or additional staff.

Superannuation Fund.

The position of this fund is not at all clear, and the matter will be taken up separately, but if as suggested above, the present Accounting Staff of the Meteorological Office remain until the 31st March next, there is no immediate urgency for this.

Store Accounts.

The Stores Accounts will have to be taken over and audited, which duty will presumably fall on F.M. 1.

Dr. Schuster pointed out that the money of the Gassiot Trust was definitely given to carry on the magnetic work at Kew Observatory or some other Observatory replacing it; and that the grant must be made by the Royal Society each year for that purpose.

The President emphasised the difficulties of the transition period, and the necessity of taking no step which would militate against the strength and efficiency of the Office. He suggested that whoever was detailed from the Meteorological Office for the work of accounting should be retained for the time being with the Director as a separate entity, which after the transition period might be merged with the general accounting staff of the Air Ministry, if this was thought advisable.

The Director pointed out the desirability of being able easily to compare the expenditure with the receipts, and therefore the necessity of having the appropriations-in-aid of the Meteorological Office included with the expenditure as a separate sub-head under those for Civil Aviation.

It was agreed that in future provision for the work of the Advisory Committee on Atmospheric Pollution should be included in the estimates for the Meteorological Office.

It was agreed that the principle set out in the memorandum should be accepted, but that a separate account should be kept. It was further agreed that the Director and Mr. Meadowcroft should propose a form for the method of accounting.

820. Co-ordinated Service of the Meteorological Office.—**Admiralty.**—*Proposed transfer of the Naval Meteorological Service to the Meteorological Office* (Minute 811).—Reported—the receipt of a letter M.O. 25,206 from the Hydrographer setting out the qualifications and particulars of service of the members of the staff of the Naval Meteorological Service.

It was agreed that the officer in charge of the Naval Division after transfer might for the time being rank as Superintendent.

Estimates 1919-1920 (Minute 811).—Reported—the following Treasury letter :—

52589/19.

Treasury Chambers,
16th January, 1920.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury Mr. McAnally's letter of the 6th ultimo (A.42512/S.1.) regarding the staff required for the effective performance of the extended and co-ordinated Meteorological Services that will now fall to be performed under the Air Ministry in accordance with the decision of the Home Affairs Committee of the War Cabinet.

In reply, I am to request you to inform the Air Council that My Lords are willing as a provisional measure to authorise the Air Council immediately to offer civilian appointments to certain Royal Air Force officers who have been engaged on meteorological work, and who are about to be demobilised, with salaries within the existing civilian scales up to a number not exceeding 50 per cent. of difference between the present and proposed establishment of the classes of Assistant Superintendent and Senior and Junior Professional Assistants. It is understood that these appointments will be made on a temporary basis, and that the initial salary will be either at the minimum of the existing scale or with increments based on the length of time that the officer has been employed continuously on meteorological work while holding a commission or otherwise. Their Lordships' sanction is given without prejudice to Their ultimate decision respecting either the rates of pay of the staff of the Meteorological Office in future, which will, as suggested by the Air Council, fall to be considered in due course by the Committee which They have appointed, under the Chairmanship of Sir T. L. Heath, K.C.B., K.C.V.O., F.R.S., to advise Them on the remuneration of scientific staff employed by the Government generally or to the ultimate size of the new and co-ordinated Meteorological Service.

I am to request that the Council will cause a detailed memorandum, explaining in full the duties and qualifications of each grade of the staff, to be furnished at an early date to Mr. E. E. Bridges, Treasury Chambers, Whitehall, S.W.1, the Secretary of the above Committee, in order that a meeting of the Committee may be summoned to consider the question. In the meanwhile I am to remind the Council that Treasury sanction has not been obtained, even for the rates shown in Enclosure B to your letter under reply (which in some cases already exceed the pre-war scale *plus* the latest Civil Service bonus), and that every candidate for an appointment should be warned that his initial salary is fixed provisionally only and subject to Treasury approval.

Notwithstanding the additional duties which will now fall to be performed by the Meteorological Staff, My Lords will be glad to receive more detailed explanation of the necessity for an increase from approximately 170 (as They understand) to 374 persons.

I am, &c.,
M. G. RAMSAY.

The Secretary,
Air Ministry.

Submitted—the following draft reply together with a memorandum on the duties and qualifications of the various grades of the staff :

WITH reference to Treasury letter No. 52589/19 of the 16th instant, the questions raised in Their Lordships' letter—namely, (1) the duties and qualifications of each grade of the Staff of the Meteorological Office and its establishments in the United Kingdom and elsewhere and (2) an explanation of the necessity for an increase of the Staff from approximately 170 (as Their Lordships understand) to 374 persons—have been referred to the Meteorological Committee, and the Air Council have received explanations in reply which they beg leave to submit for Their Lordships' consideration.

The Committee desire to deal first with the question numbered (2), because the possibility of effective organisation of the Meteorological Service depends upon the nature and extent of the service which Government desires to maintain. That service has to be considered not only in relation to the local requirements of the United Kingdom but also in relation to wider organisations with a view to ordinary international agreements in the first place, to naval interests in the second place, and in the third place to the development of civil aviation as a means of communication between the several parts of the Empire. In this wider organisation Foreign Countries and Dominions may be expected to co-operate independently, but the Crown Colonies and Dependencies are not generally at present in a position to maintain independently the meteorological services which the wider Imperial interests indicate as required, and for a time at least there must be closer association between the local services and the central service of the Empire than is likely to be found practicable in the case of Foreign Countries or the self-governing Dominions. The Central Meteorological establishment must be prepared within reasonable limits to send suitably trained staff to initiate and organise the local arrangements where these are necessary.

Their Lordships take the point that it is proposed to increase the Staff of the newly co-ordinated Service from 170 to 374. That way of putting it overlooks the fact demonstrated fully by the experience of the war that the application of meteorological information to practical purposes requires local establishments to receive the information collected from a very wide area by the Central Office, to supplement it by information obtained by means of local observations, and to explore and explain the bearing of the information upon special questions to those whose proceedings are to be guided by it. The positions of these local establishments must be selected simply with a view to serving the persons who are to use the information ; they must exist, for example, at certain aerodromes on established air routes. This side of the work of the Meteorological Office accounts for nearly all the increase of the Staff required. It appears in Their Lordships' presentation of the case as new ; it is, however, only new as compared with pre-war conditions.

Before the war the only places besides the Central Office in South Kensington where work of this kind was carried out were :—

(1) At South Farnborough, by a branch Meteorological Office; (2) at Upavon, by a Meteorological Officer appointed by the Army Council; and (3) at Kingsnorth, by a Meteorological Officer appointed by the Admiralty. During the war it was extended to a series of places near the coasts selected partly by the Admiralty and partly by the United States Navy, to a series of places in France, Italy, Salonika and Northern Russia. The combined services employed about 600 specially trained persons, or 900 if the American contingent is included.

It is upon the success of this system of having an expert Meteorological Staff established at places where meteorological information is to be applied that has created and justified the demand for increased meteorological facilities. It would certainly have developed, apart from the war, with the gradual development of meteorological science. A large number of such establishments were set up in the British Isles for the Naval Air Service, with special reference to airships which patrolled the coasts. They were found to be useful not only for their primary purpose of distributing appropriate information locally but also as being able to contribute to Headquarters the special observations of upper winds and clouds which they made in the course of their local work. These, transmitted to Headquarters, formed a very useful body of information that gave an insight into the distribution of air-currents, clouds, &c.

Information of that character which requires an expert Staff was only supplied from six of the 30 stations upon which the Meteorological Office relied for its daily maps and could not be initiated at the others without a Staff of the same order as that employed upon the work at the R.A.F. stations. By reason of the general utility in this respect, many of the stations were maintained after the special service of airships was discontinued and the local utility of the information had diminished. On 20th August last 40 were still in operation, employing 268 officers and other ranks of the Air Force. Adding the Staff of the Meteorological Office at the same date (the 170 referred to by Their Lordships), there were employed in meteorological services in the United Kingdom (a few in Northern France) 438 persons. Many of the establishments were at the time understaffed in consequence of gradual demobilisation, and the full complement was not far short of 500 persons. It is proposed to reduce these numbers within the current financial year to 374.

The situation which the Committee had to face in proposing this reduction of the co-ordinated Service was as follows :—

(1) The 40 distributive stations of the R.A.F. in the United Kingdom were not, as a rule, in the localities where they were required for the purposes of the Royal Air Force and Civil Aviation as defined by new conditions.

(2) A list of 20 stations chosen on other grounds was supplied to the Committee. Two such establishments for the Army were already in operation at Shoeburyness and Lavington, in accordance with an undertaking of the Committee included in the estimate for 1919–20. Provision is made for 12 out of the 20 distributive stations named by the R.A.F. and Civil Aviation and also for an establishment at Malta, which is urgently required for the satisfactory treatment of the Meteorology of the Mediterranean. As the new organisation proceeds provision for the other eight stations will become necessary, and some additional provision will be required for the great Air Routes of the Empire.

(3) The number of contributive stations of the Meteorological Office which could provide the necessary observations of the upper air had to be increased, and provision is made for 10 in all of such stations. They can be supplemented to some extent by observations from the 12 distributive stations.

(4) The Staff to be maintained at the stations in the United Kingdom is considerable, because provision has to be made for observations every six hours, including an observation at 1 a.m. This is part of an international scheme included in the Peace Treaty as the Convention on International Aerial Navigation. There are accordingly provided in some cases one, in others two, professional meteorologists; in each case a senior technical assistant and in some cases three, in others five junior technical assistants.

A technical assistant is originally a boy from a secondary school taken on at 17 and trained in observing and computing. He must have some acquaintance with algebra, formulæ, numerical tables and so on. This requirement implies a higher stage of education than is necessary for observers at ordinary meteorological stations and more than that of the ordinary boy clerk.

(5) Provision has been made for two "port officers" at Glasgow and Liverpool, each with an assistant attached to the Marine Division. This is necessary in view of the urgent importance of better observations of pressure and accurate observations of a naval character from ships at sea. No satisfactory progress can be made in this direction without personal interviews on the part of the Meteorological Office with the officers who observe. It has long been the practice to employ Port Meteorological Officers in the United States and Canada. We on the East are more vitally interested in observations from the Atlantic than they on the West, and we must get the confidence and respect of the officers if wireless observations from the Atlantic are to be of the value they are generally supposed to be and might be.

The schedule of establishments is as follows :—

(Table Minute 811, p. 458.)

Meteorological Office,
26th January, 1920.

The Committee have dealt with the duties and qualifications of the Professional Staff in a separate memorandum.

DUTIES AND QUALIFICATIONS OF EACH GRADE OF THE STAFF.

The Senior Professional Assistants form the typical grade as they are concerned with a single administrative unit. The grades above them, Assistant Superintendent, Superintendent, or Assistant Director, have to deal with smaller or larger groups of units. The grade below them, viz., Junior Professional Assistant corresponds with the period of technical and scientific training (five years at most) which is necessary to enable a student after completing his degree in science to become fully qualified in the technical subjects and prepare him for the charge of a unit.

The grade of Senior Professional is understood at present to include meteorologists, terrestrial-magneticians, atmospheric electricians, seismologists. Although meteorologists are now numerically very largely predominant it is still important not to lose the connexion with the other sciences as to some extent the explanations of the more complicated phenomena of the atmosphere are the expressions of physical conceptions common to all the sciences and more simply illustrated by magnetic or electrical phenomena. Lord Kelvin pointed out that whereas in times past electrical phenomena were explained on the analogy of fluids now the analogy of electricity is employed to explain the more complex phenomena of fluid motion. For meteorologists, therefore, collateral training in the theoretical and practical sides of the other subjects is practically indispensable.

The duties of a Senior Professional Assistant include :—

(1) The charge of a separate observatory-unit, or in a larger observatory, the section of the observatory devoted to his special subject. While conducting the routine and transmitting reports four times a day to the Central Office, he must be prepared to try new methods to improve the instrumental equipment and follow out researches, either of a local character suggested by his local experience or in co-operation with other units through the Central Organization. In a simple unit he has four technical assistants in his charge, one of considerable experience and three juniors, and with these he has to manage observations as required day and night, and carry out all the other technical duties.

(2) As meteorologist at a *distributive centre* he has to carry out the work of a local forecast-station, receive the necessary data from the Central Office, incorporate the local data, formulate an opinion upon the local effect of the general conditions, and advise the local air authorities. pilots and others on the meteorological situation of the present and future. In many cases the safety of lives and property may depend upon his issues.

For this purpose a certain combination of trained scientific judgment with willingness to face a situation in which a decision, yes or no, must be taken, is necessary. It is easy to get either separately: the combination requires preliminary qualifications aided by technical training. It may be necessary sometimes even for a scientific authority to make a guess, but it is also necessary that his training should enable him to be clear in his own mind as to what is scientific inference and what is guess.

The gradual extension of the region of inference in place of guessing in the practical application of meteorology implies an effective knowledge of meteorological literature and a retentive memory for the analogies of previous situations.

The normal qualifications for these appointments are :—

(1) A degree in science with first class honours in mathematics or physics. A Cambridge wrangler with a second degree in the Natural Sciences Tripos is typical of the preliminary educational requirements.

(2) A practical training in the work of the Office at the Office or at one of its observatories or stations for two or three years in the technical side of the work as Junior Professional Assistant.

For certain special sections of the work an Officer of the Royal Navy or of the Corps of Royal Engineers, and doubtless in course of time of the Navigation School of the Royal Air Force, or exceptionally an officer of the Mercantile Marine, may be chosen and classed in the same grade with those who have the normal academic training.

For the other grades :—

An Assistant Superintendent combines the duties of a Senior Professional Assistant with the general supervision of more than one unit or at headquarters the combination of observations from a wide area and responsibility for the issue of forecasts and other public notices on behalf of the Director.

A Superintendent has charge of one of the larger observatories or a division of the Office which can be marked off by definite duties. The Superintendents at present are :—

1. The Marine Division.
2. The Division of Climatology and Statistics.
3. The Division in charge of the supply of instruments.
4. The Forecasts and Storm Warnings of the Central Office.
5. The Distributive Stations of England and Wales.
6. The Meteorological Organization of Scotland.
7. The Head of the Observatory at Eskdalemuir.
8. The Superintendent of meteorological work for Army Services.
9. Rainfall Organization.
10. Atmospheric Pollution (at present an honorary officer with approximately the status of a Superintendent).
11. Naval Meteorological Service.
12. A Superintendent is also proposed for the organization of the meteorology of the Mediterranean at Malta.

An Assistant Director, as the name implies, assists the Director in the administration and supervision of different sections of the work of the Office.

The Director of a Principal Observatory is a grade that has not yet been introduced. Hitherto the heads of the principal observatories have been superintendents relying upon the Director for all details of administration and direction, but in three departments at least, namely—

(1) The Central Observatory of the Office,
(2) The chief observatory for the scientific study of the upper air,
(3) The chief observatory for the physical subjects other than meteorology,

the head of the institution might be prepared to accept greater administrative responsibility, if for no other reason, because such an opportunity would be valuable in the succession to the post of Director or Controller, which requires administrative capacity as well as scientific experience.

Approved.

Submitted also—a suggested scale of salaries for the professional, technical, and clerical staff.

It was agreed that the question of the suggested scales should be referred to the finance sub-committee, and the approved scale should be submitted to Mr. Bridges for consideration by the Committee appointed by the Treasury to consider the salaries of staff in scientific establishments.

Estimates 1920–1921.—*Establishment at Ascension* (Minute 791).—Reported—that further inquiry had been made by the Admiralty as to whether the Air Council had approved of the establishment of a meteorological station on the Island of Ascension.

It was agreed that provision for such a station should be included in the estimates for 1920–1921.

Meteorological Station in the Channel Islands.—Reported—a minute from the Superintendent in charge of distributive stations in England, Wales, and Ireland pointing out the necessity of establishing a pilot-balloon station in the Channel Islands (Guernsey) in view of the fact that training in aerial navigation based upon Calshot was to take place over the sea, and that without such a station satisfactory estimates of drift would be impracticable.

It was estimated that the station would require additional personnel of one Junior Professional Assistant, and two technical assistants, and that the expenditure involved would be about £1,300.

The establishment of such a station was approved in general principle, subject to financial provision.

Daily Superintendence of Forecasts.—Reported—a memorandum from Mr. J. S. Dines stating that the work of superintending the Forecast Section Headquarters was too much for one person to do satisfactorily without some professional, as distinguished from technical, assistance; and suggesting the appointment of an Assistant Superintendent for general supervision.

The recommendation was approved in general principle, and it was agreed that provision for an additional superintendent for this purpose should, if possible, be included in the estimates for 1920–1921.

War Office Requirements (Minute 814).—Reported—the following correspondence:—

The Director,
Meteorological Office,
Air Ministry.

M.O. 25710.

WITH reference to a letter (copy attached) addressed by me, as War Office Member of the Meteorological Committee, to the Director of Artillery, asking for certain information to enable me to state future War Office meteorological requirements, the following are the replies received to the questions asked in the above quoted letter:—

1. *Artillery Ballistics.*—The War Office wishes the Meteorological Station established at Shoeburyness in connection with the Experimental Artillery Ranges maintained.

The Meteorological Committee agreed at their last meeting that the Shoeburyness station should be equipped as a regular Meteorological Observatory for determination and report of upper air conditions. Such reports have been rendered three times daily to the Meterological Office by telephone during the past month.

The Director of Artillery wishes it confirmed that the Meteorological Office will undertake provision of personnel and of such equipment as is required by an Observatory regularly reporting upper air conditions, *e.g.*, kite balloons, hydrogen, &c.

The money for provision of equipment required for determination of meteorological data purely for Artillery equipments, *e.g.*, pilot balloons, hydrogen, &c., and for repairs to Artillery meteorological instruments, also ammunition and guns for measuring upper air currents by means of shell bursts has been estimated for and will be a charge to experimental establishment funds.

If agreed to it is proposed in future to mark all demands on Meteorological Office for stores either

(i) Meteorological Office charge,
or (ii) War Office charge.

2. *Gas.*—Still under consideration.

3. *Artillery Practice in the Field.*—During the present year the only practice camp requiring meteorological data will be on Salisbury Plain (Chapperton Down and Lark Hill).

I am to ask whether this meteorological data can be supplied by any of the existing or proposed Air Ministry observations in that neighbourhood, or whether a separate establishment purely for Artillery work is advocated.

In the latter case it would be of great assistance to the War Office if you could include in your reply

(i) Approx. yearly estimate for personnel.
(ii) „ „ for Meteorological Instruments and Stores.

4. *Coast Defence Practice.*—No meteorological requirements.

5. *Manœuvres.*—No meteorological requirements.

H. A. LEWIS,
Lieut.-Colonel,
Superintendent of Experiments,
W.O. Member, Meteorological Committee.

Shoeburyness,
23rd January, 1920.

D. of A.

Enclosure.

IN accordance with your instructions 3/Gen. No./148, I attended the first meeting of the Meteorological Committee, Air Ministry, on November 5th, as the War Office representative.

At this meeting I was asked to find out before December 3rd (date of next meeting) what the War Office requirements for the next year were likely to be.

I have been considering these and have also been in consultation with Sir Napier Shaw, Controller Meteorological Office, and Captain Brunt, late R.E., who is on the staff of the Meteorological Office, and who is in charge of the Meteorological Stations at present in Army use.

I am of opinion that the following requirements should be met. How they are met is a matter for the Meteorological Committee to decide, some can no doubt be combined with civil arrangements and others with R.A.F. stations.

WAR OFFICE REQUIREMENTS.

1. *Artillery Ballistics.*—Research in Science of Meteorology applied to gunnery is required. Our knowledge in this respect is small, and should be increased. This can be done at the Experimental Ranges, Shoeburyness.

I propose pressing that this station shall be thoroughly equipped so that the effect of upper air conditions on weather generally as well as on ballistics may be determined.

2. *Gas.*—Research work to find out the effect of varying meteorological conditions on gas dispersion is necessary. If the gas range at Porton is to continue I would suggest that a small party under a capable director be asked for to study this subject. Practically ground observations only would be required, so that the installation would not be large.

3. *Artillery Practice in the Field.*—The war has taught Artillery Officers the value of knowing meteorological conditions when fighting.

I am of opinion that at next year's practice camps the battery should receive meteorological telegrams as they did in the late war so as to get the best value out of the ammunition they expend.

To make arrangements for this it is necessary to know :—

(*a*) Where practice camps will be held.
(*b*) During what period these camps will be open.

4. *Coast Defence Practice.*—(*a*) and (*b*) as above.

5. *Manœuvres.*—It is thought that some military meteorological formation should be started, *e.g.*, a Territorial Company R.E.

This company would be available fully equipped for manœuvres and would be the nucleus for expansion in future expeditions.

Their annual training could be carried out at Shoeburyness at times most convenient to themselves, in fact it would be better if they came a few at a time.

The best type of man is the Mathematical Schoolmaster.

If War Office requirements in this respect were formulated the Meteorological Committee would propose an establishment for which they could eventually select suitable volunteers.

I would ask that I may be given approval for requirement 1, and early answers to requirements 2, 3, 4 and 5, so that a minute can be circulated to members of the Committee before the meeting takes place.

H. A. LEWIS,
Lieut.-Colonel,
Superintendent of Experiments.

Shoeburyness,
14th November, 1919.

It was agreed to accept the suggestions set out in the letter subject to financial considerations.

Reported also—a memorandum M.O. 25761 from the Superintendent of Army Services proposing a scheme to meet the requirements of Larkhill Gunnery School by transfer of the station from West Lavington to a position near Larkhill to be decided later.

The Director said that the details of the station on Salisbury Plain required consideration, but that probably no additional expenditure would be necessary.

821. Office Staff.—**Superannuation** (Minute 812).—Reported—that the following members of the staff retired from the service of the Office on 31st December :—Mr. F. J. Brodie (Minute 732), Principal Assistant in the Forecast Division, who joined the Office in 1869 ; Mr. W. G. James, Staff Assistant in the Marine Division, who had been in the Office, except for a break of four years, since 1869 ; Mr. J. Sheerman, Principal Assistant in the Statistical Division, who came to the Office in 1882 ; and Mr. R. F. Wallace, Principal Assistant in the Instruments Division, who joined the service in 1883.

Obituary.—Reported—the death, on 24th January, 1920, of **Mr. R. F. Wallace**, formerly principal clerk in the Instruments Division. He had been in the service of the Office since 1883, and was among those who retired on 31st December, 1919.

Demobilisation (Minute 801).—Reported—the demobilisation of the following members of the office staff :—

Sergt.-Major R. M. Poulter (Minute 754), on 9th October.
Lieut. M. A. Giblett (Minute 782), on 31st October.
Sergt. C. F. J. Jestico (Minute 754), on 1st November.
Captain H. W. L. Absalom (Minute 801), on 15th November.
Captain F. Entwistle (Minute 801), on 22nd November.
Lieut. R. P. Batty (Minute 765), on 24th November.
Captain J. Durward (Minute 801), on 28th November.
Sapper W. J. Fowler (Minute 716), on 8th December.
Flight-Lieut. H. G. Harris (Minute 811), on 31st December.

The members of the staff who remain in military or air service are :—

E. L. Ardley, Cashier—permanent commission R.A.F.
A. E. Gendle, O.B.E., Instruments Division, permanent commission as Flight Lieut. upon qualifying as a pilot.
J. L. Gray, Marine Division, Lieut. K.O.S.B.

Resignations.—P. de Rome — Reported — the resignation on 13th November (M.O. 14324) of P. de Rome, Junior Professional Assistant (Minute 774), to take effect on 31st December, 1919.

C. McRae—Reported—the resignation on 23rd December (M.O. 16639) of C. McRae, Boy Clerk at Aberdeen (Minute 732), to take effect on 3rd January, 1920.

Squadron Leader C. P. Hearle—Reported—the resignation on 16th January, 1920 (M.O. 25425), of Squadron Leader C. P. Hearle, Superintendent of the Malta Meteorological Service (Minute 792), to take effect on 28th January.

Mrs. E. G. Bilham—Reported—the resignation of Mrs. E. G. Bilham, Clerk Computer in the Library (Minute 765), on 20th January (M.O. 25528), to take effect on 31st January.

Promotions and Increase of Salary.—Reported—the following Director's Orders for confirmation :—

Order 942 increasing the salary of **G. M. Watson**, Junior Professional Assistant for the investigation of atmospheric pollution (Minute 750), from £200 per annum to £250 per annum in accordance with the estimate contained with the report of Atmospheric Pollution (03591/19). The increase to date from 1st October, 1919.

Order 951 promoting the following members of the office staff—**W. Hayes** (Minute 754) from Staff Assistant to Principal Assistant on the retirement of Mr. F. J. Brodie ; **A. G. W. Howard** (Minute 667) from Staff Clerk to Staff Assistant on the retirement of Mr. W. G. James ; **J. H. James** (Minutes 599 and 754) from Staff Assistant to Principal Assistant on the retirement of Mr. Wallace. The promotions to date from January 1st, 1920.

Order 980 promoting **H. G. Harris** (Minute 811), Flight-Lieutenant R.A.F., on demobilisation to Staff Assistant with duty until further order at Kew Observatory.

Order 986 promoting **W. R. Penfold** (Minute 667) from Boy Clerk to Technical Assistant as from 1st February, 1920.

Order 993 promoting the following members of the office staff—**A. R. Simpkins** (Minute 754) from Staff Assistant to Principal Assistant in the Statistical Division on the resignation of Mr. J. Sheerman ; and **H. E. Carter**, British Rainfall Organization, to Staff Assistant.

Order 995 transferring **E. L. Clinch** (Minute 754) to the Instruments Division with promotion to the grade of clerk. The promotion to date from 1st January, 1920.

Special Leave.—Reported—that special leave of absence without pay had been granted to **H. J. Bigelstone** (Minute 754), Probationer in the Instruments Division, and **C. V. Ockenden**, Technical Assistant at West Lavington (Minutes 754 and 762), in order that they might avail themselves of grants of the Board of Education to complete their degree courses and qualify for posts on the professional staff. (Orders 973 and 982.)

New Appointments.—Reported—that in accordance with the terms set out in Minute 801, with informal sanction from the Treasury, subsequently confirmed by Treasury letter 52589/19 (Minute 820), the appointments to professional posts on the staff of the office had been offered and accepted as follows :—

Senior Professional Assistants :—

To date from—	*Per annum.* £
1920—Jan. 1st, Capt. E. W. Barlow, R.A.F.,	at a salary of 405 (Order 975).
,, ,, 1st, Capt. J. Crichton, R.A.F.,	,, ,, 420 (Order 984).
,, ,, 8th, Capt. G. L. H. Douglas-Lane, R.A.F.	,, ,, 375 (Order 968).
,, ,, 1st, Capt. W. Gillon, R.A.F.,	,, ,, 420 (Order 976).
,, ,, 1st, *Lieut. G. Harris, R.A.F.,	,, ,, 405 (Order 981).
,, ,, 1st, Capt. H. F. Jackson, R.A.F.	,, ,, 405 (Order 977).
,, ,, 1st, Lieut. J. Logie, R.A.F.	,, ,, 405 (Order 978).
,, ,, 1st, Capt. R. M. B. Mackenzie, R.A.F.	,, ,, 375 (Order 974).
,, ,, 1st, Capt. W. H. Pick, R.E.,	,, ,, 390 (Order 958).
,, ,, 6th, 2/Lieut. R. S. Read, R.E.,	,, ,, 390 (Order 969).
Demobilisation—Lieut. J. J. Somerville,	,, ,, 390 (Order 979).

Junior Professional Assistants :—

To date from	*Per annum.*
1920—Jan. 26th, Capt. J. E. Cowper,	at a salary of 250 (Order 967).
,, Feb. 2nd, J. Wadsworth,	,, ,, 250 (Order 998).
,, Jan. 21st, H. Dyke Marsh,	,, ,, 250 (Order 987).

Reported also—that with similar sanction, in accordance with the terms set out in Circular 002(A), the following appointments had been made :—

Staff Assistants (salary £175 per annum, plus war bonus) :—

To date from—
1920—Jan. 12th, D. F. Bowering, Lieut. R.A.F. (Order 964).
,, ,, 15th, J. F. Davison, Cpl. R.A.F. (Order 963).
,, ,, 13th, F. M. Dean, Sergt. R.E. (Order 970).
,, ,, 12th, J. G. Goodyear, Lieut. R.A.F. (Order 962).
,, Feb. 2nd, E. S. Tunstall, Cpl. R.E. (Home) (Order 971).
,, Jan. 13th, G. A. Wright, Sergt. R.E. (Order 959).

Technical Assistants (salary £75 per annum plus war bonus) :—

To date from—
1920—Jan. 12th, W. Andrews, Lieut. R.A.F. (Order 966).
,, ,, 12th, J. D. Ashton, Lieut. R.A.F. (Order 965).
,, ,, 12th, S. N. Plummer, Met. Sect. R.A.F. (Order 960).
,, Feb. 2nd, R. L. Sims, Met. Sect. R.E. (Order 991).
,, ,, ,, J. S. Smith, Met. Sect. R.E. (Order 990).
,, Jan. 14th, T. F. Twist, Met. Sect. R.A.F. (Order 961).
,, ,, 20th, E. S. Ward, Met. Sect. R.A.F. (Order 988).

Reported—Order 983 appointing **G. H. Webb**, Handyman at Kew Observatory, at a weekly wage of 27*s.* 6*d.* plus 17*s.*, plus 30 per cent. of 27*s.* 6*d.*, inclusive of war bonus. The appointment to date from 5th January, 1920, and to be terminable by one week's notice on either side.

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* Acting Senior Professional Assistant (*see* Minute 811).

That on the recommendation of Prof. C. Niven, **G. M. Rattray** had been appointed Boy Clerk in place of C. McRae, resigned. (Order 1008).

Order 1000, authorising the Assistant Director in charge of Forecasts to employ Commissionaire **J. L. Evans** (Minutes 654 and 754) on alternate weeks in evenings as overtime, from 6.30 p.m. to 8.30 p.m. (Winter) and 7.30 p.m. to 9.30 p.m. (Summer time), including Sundays ; pay to be in accordance with the ordinary rates for overtime.

Order 1001 appointing **Ronald Leslie Matthews** (born 4th October, 1904) Boy Messenger in the Forecast Division, with wages of 16*s.* a week, with war bonus of 4*s.* 6*d.* a-week. The appointment to date from 26th January, 1920.

Marine Division—Order 992 authorising the Marine Superintendent to detail a member of the staff of the Marine Division to visit ships in the Port of London in connection with the collection of Marine observations ; on condition that the officer so detailed be not absent from the office for more than four days at most in the week. For the officer so detailed travelling on office business the cost of a monthly first-class season ticket between Fenchurch Street and Tilbury will be borne by the office.

Approved.

War Bonus (Minute 801).—Reported—the following Treasury letter :—

M.O. 25290.—46391/19. Treasury Chambers,
10th January, 1920.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury your letters of the 29th October last (13586) and 27th November last (16111) further respecting the grant of war bonus to the staff of the Meteorological Committee, and I am to convey to you the following reply :—

1. The necessary funds for payment of this bonus will be provided under Air Votes for 1919-20.

2. My Lords agree in the circumstances that Messrs. J. A. Curtis and C. Harding should be granted war bonus calculated on the sum of £240 per annum, which in effect represents their remuneration for their present services.

3. My Lords note that the question of the war bonus for the officers named in the First Schedule has now been disposed of. They observe that, by Minute 780 of the Meteorological Committee, new consolidated scales have been proposed for Officers down to the rank of Junior Professional Assistants, and in a separate letter They are requesting the Air Council to arrange that these shall be submitted to the Committee appointed by Their Lordships under the Chairmanship of Sir Thomas Heath, K.C.B., K.C.V.O., F.R.S., for revision and subsequent recommendation to this Board.

4. My Lords now approve the grant of war bonus as proposed to the Senior Professional Assistants, Staff Assistants, Clerk Assistants and Clerk Computers, as shown in the revised list of the Schedules enclosed with your letter of the 24th November, subject to the following observations :—

(*a*) Women employed in these posts should, of course in all cases, get the women's rate of bonus only ;

(*b*) In Schedule 5, Miss Coleman should be treated like Miss Figgins in Schedule 8, receiving the new bonus less the sum of £11 6*s.* 8*d.* by which her substantive salary now exceeds the normal salary for an employee of her seniority.

5. Having regard to the fact that these proposals were framed by you before the promulgation of the Award No. 101 of the Civil Service Arbitration Board, My Lords are now pleased to authorise the application of that Award in full, subject to the conditions set out in the Treasury Circular of 27th November, 1919, to those Officers of your staff who have been recognised as eligible for Award 84.

I am, etc.,
M. G. RAMSAY.

The Director,
Meteorological Office.

Award 101, which has effect from 17th November, 1919, increases the amounts payable by way of war bonus under Award 84 as follows :—

(*a*) The percentage rate of bonus payable to persons of 16 years of age and upwards shall be increased to 30 per cent. of their "ordinary remuneration."

(*b*) The flat rates of war bonus shall continue unchanged.

(*c*) The maximum total rate of bonus shall be increased to £500 a year for men, and £300 a year for women.

Award 77.—Reported—that the following amounts were payable under Award 77 which applied only to members of the staff with salaries over £500 and referred to the three months January, 1919, to March, 1919 :—

	£	*s.*	*d.*
Sir Napier Shaw	31	5	0
Dr. C. Chree	22	13	3
R. G. K. Lempfert	21	5	0
F. J. W. Whipple	19	15	0

The Assistant Secretary undertook to obtain the necessary authority for payment.

822. Observatories and Stations.—**Malta** (Minutes 791 and 811).—*Conditions of Service.*—Submitted—a letter from Major C. P. Hearle, Superintendent of the Malta Meteorological Service, containing proposals as to the conditions of service of staff serving in Malta.

It was agreed that the question of the conditions of service of staff serving at stations outside the United Kingdom be referred to the Finance Committee.

Kew Observatory. — *Magnetic Storms as affecting telegraph cables.* — The consideration of a letter from Mr. Raymond Barker suggesting that the Observatory should notify magnetic storms for the information of telegraphists in charge of cables was deferred.

Storm Warning Stations (Minute 802).—The proposal of the Assistant Director in charge of Forecasts that, while adhering to the restriction of the number of free telegrams to storm warning stations to 200, the number of cones should not be so limited was approved.

Payment to Climatological Stations:—Application has been received for payment for returns supplied in connection with the Weekly Weather Report from—

(1) the Urban District Council of Bettws-y-Coed, Senor Percivale Bouch, observer. (M.O. 13496).

(2) the Cumberland and Westmoreland Farm School, Newton Rigg, J. Robinson, observer. (M.O. 14599).

Payments in order to maintain the continuity of the observations at District Stations were authorised under Minute 544, and it is proposed in these cases to make the grant of £8 for Rainfall, Temperature and Sunshine, on condition

(1) that the arrangement is made in each case with the authority concerned, and not with the observer personally ;

(2) that it is expressly for the Weekly Report and will cease if the contribution to the Weekly Report is not maintained.

West Lavington.—Reported—that with the demobilisation of Captain J. Durward on 28th November, 1919, the establishment at West Lavington came under the administration of the Meteorological Committee, and the Meteorological Section, R.E. (Home) ceased to exist.

The official address is therefore altered to :—

The Meteorologist-in-Charge,
Meteorological Office,
West Lavington,
Littleton Panell,
Wilts.

823. Advisory Committee on Atmospheric Pollution (Minute 813).—Reported—the following letter :—

M.O. 25563.

Advisory Committee on Atmospheric Pollution,
47, Victoria Street,
Westminster, S.W.1,
19th January, 1920.

Dear Sir,

I have been instructed by the Advisory Committee to direct the attention of the Meteorological Committee to the Statement of Accounts of the former Committee for the current year, which shows a balance in hand on the 15th instant of £89 5*s.* 2*d.* I have examined the Accounts and compared the figures with the estimate sent to the Department of Scientific and Industrial Research when applying for the grant, and I find that there is no serious discrepancy between the estimate and the actual expenditure, but that, unlike previous years, we shall have practically no balance in hand at the termination of the current year on 31st March next, so that provision should be made for carrying on the work of the Committee.

The Advisory Committee have also requested me to place before the Meteorological Committee a copy of the following minute, which was passed at their last meeting, held on the 16th instant :—

> "That, in view of the termination shortly of Sir Napier Shaw's appointment as Director of the Meteorological Office, this Committee beg leave to request that provision may be made for the modification of the regulations to enable Sir Napier Shaw to continue to act as Chairman of the Advisory Committee on Atmospheric Pollution."

This resolution was proposed by Bailie W. Smith, seconded by Mr. W. Clark, and carried.

Would you kindly see that the above matters are placed before the Meteorological Committee at their next meeting.

Yours faithfully,
J. S. OWENS.

The Director,
Meteorological Office,
South Kensington, S.W.7.

It was agreed that authority be given to the Advisory Committee to overspend the grant by the amount necessary to carry on the work to the end of the financial year and to charge the excess against the grant-in-aid.

824. PUBLICATIONS.—**Climatological Atlas** (Minute 815).—The following memorandum, submitted by the Director in accordance with Minute 815, was approved :—

WHEN it was arranged in November, 1911 (Minute 315), to take over from the Society the collection of data from voluntary climatological stations in England it was agreed to be desirable that the Society should find employment for the staff of its office in preparing for publication the climatological data which had accumulated since the beginning of things so that a satisfactory Climatological Atlas of the British Isles might be published. Dr. H. N. Dickson took part in the arrangements and formulated the scheme of maps. The Office undertook to contribute £50 a year for three years to the expenses of the Society's office in order that the staff might be maintained.

The first volume of the material for the atlas (pressure and winds) is now more or less ready for publication and a second volume (temperature, rainfall, sunshine and non-instrumental observations) remains to be done. But the staff of the Society's office has been re-organised in such a way that it no longer finds time to do anything more than the ordinary office work. It has no time for compilation.

We are not in any special need of maps of temperature and sunshine because we have practically complete data for them, but good monthly maps of rainfall are an urgent necessity and the acquisition of the British Rainfall Organization gives us the opportunity.

The Society has employed Mr. W. A. Bion, a retired Indian meteorologist, for the first volume, who is very anxious to supplement his retiring allowance by work of that kind. He is about 60 years of age.

It is difficult at this stage to make permanent appointments. I suggest that I may be allowed to employ Mr. Bion at £20 a month from month to month for not more than ten months of this year to prepare monthly maps of Rainfall at British Rainfall Organization for the atlas, and to help in the work of the Organization generally.

It will get over a difficulty which has been frequently represented by the Superintendent, and provide maps which we have been wanting for many years. Meanwhile Mr. Nahon is acting as a volunteer worker at South Kensington, getting out the non-instrumental data, and Dr. Dickson is understood to have made another atlas, on his own, for the Admiralty.

NAPIER SHAW.

Meteorological Office,
Air Ministry,
Kingsway, W.C.2.
27th January, 1920.

Modification of Forms for Marine Observers.—Submitted—the following memorandum by the Marine Superintendent :—

IN accordance with your minute of 1st January, 1920, addressed to Mr. Corless, proofs of the

Meteorological Log,
Original Note Book,
Cadets Meteorological Log, and
Data Book

are to be printed for submission to the meeting of the Committee on 28th January. The reprints of the Meteorological Log and Original Note Book contain new columns for observations on :—

1. Currents,
2. Rainfall,
3. Visibility and fog scales, brought up to date, also slight modifications in
4. The Beaufort Scale letters, to bring them into line with International practice.

1. Hitherto the log has only asked for currents for the 24 hours, and currents which might often be ascertained in favourable circumstances at shorter intervals by means of the difference between dead reckoning positions and terrestrial or stellar fixes have been omitted ; the remarks column not proving a sufficient *reminder* of the particular importance of divergent currents within the day's run and often giving, by general 24 hours results, an entirely wrong impression. This modification may be almost "fool-proof."

2. Hitherto raingauge readings have only been required once in the 24 hours, at 8 a.m. In extracting data with this method liability of error occurs. For example, a steamer in the Doldrums in Lat. 6° N. at 8 a.m., steering south, speed 15 knots, experiences heavy rain throughout the forenoon watch, at noon she picks up the south-east trade, with fine weather ; unless the observer has carefully made the notation (r) in the weather column and the duration of rain in the remarks column,

the extractor is apt to set the rainfall down in the square for Lat. 1° N. If reliance is to be placed on rainfall observations at sea, the raingauge should be taken at the same time as the other observations, *i.e.*, every watch. Error due to spray can also be lessened. It is proposed to endeavour to get slow ships, cable ships, &c., to observe the rainfall.

3. The question of visibility is vital to seamen in navigation. Too much refinement in estimating the density of fog at sea might lead navigators of no great experience to disaster. None but those who have had the responsibility of navigating ships with many lives, and valuable cargoes, or vital operations at stake, can appreciate what fog means to the captain, and its extraordinary peculiarities.

The scales published in Appendix V, M.O. 237 (International Meteorological Committee), also in the Daily Weather Report, have been used giving limiting distances only, with equivalent measurements used at sea, *i.e.*, nautical miles, cables and fathoms. Lieut.-Col. Gold's scale has not been used after consideration. At sea approximate estimates can only be made from a ship under way. In pilotage waters, the time run from a buoy until the moment of disappearance might be used.

It is proposed to take every opportunity to point out to Marine Observers the need for these refinements *in observing for the Office*, and at the same time giving warning for the reason stated above.

Some of the reasons from the point of view of the Marine Division for more exact observations are :

A. In order to compute in the future more exactly fog frequency in the Trade Routes.

B. In order to investigate the causes of fog.

C. In order to investigate visibility.

4. The Beaufort letters have been brought into line with those in general use in the Meteorological Service, necessary for the more exact methods of cloud observation ; that we are asking Marine Observers to adopt by personal letters to Captains and notices on the Charts.

5. The Cadets Meteorological Log already approved. The scales should be brought into line with the Meteorological Log. Thus in three or four years giving us observers who have been carefully trained in the use of these more exact methods.

6. The Data Book has been revised to include columns for the date, current and rainfall, and the cloud columns have been added to include both upper and lower clouds. It is in fact the convenient size adopted by the late Admiral Wharton, but, with a whole page instead of half a page to a one-degree square, it contains all that the older data books had with the exception of Lat. and Long. (given to 1° by the sub square), magnetic variation (which cannot be obtained reliably in steel ships under mercantile conditions), and the Wet Bulb thermometer.

The arrangement involves double the number of pages in each 10° square book.

There are only 500 copies of the present form 112 left ; these will be used as heretofore for working back from 1919. It is desired, at what is probably the most favourable opportunity in the history of the Marine Division (owing to the reduction of observers due to the War), to commence extracting all useful data on arrival of logs in the office from the date on which the new book is received.

This will economise in work, the information, once extracted, corrected and recorded in these books, will always be available for immediate use. Considerable saving of time will be effected in answering enquiries as to weather conditions, &c., made for commercial and legal purposes. It will afford better means of keeping a check on observers, and will enable the Marine Superintendent to see in which parts of the Oceans observations are scantiest at the time, so enabling him to endeavour to recruit observers in ships trading through those areas.

An alternative means has been considered of having a supplementary book to the present data book printed. This, however, would in the end be more expensive ; it would be more complicated, and, I fear, defeat the object of the book asked for.

I submit that the introduction of this book will be found to add to efficiency and in the end will save considerable expense.

7. It is hoped to publish articles on the backs of the Monthly Meteorological Charts which will be conducive to more exact methods of observation and show observers the use and methods their work is put to.

The need for training and education of Officers in the Mercantile Marine has been demonstrated in the late war. Where young officers, who, in peace conditions, would not have received training, the instruction and training given them in the Royal Navy has proved its undoubted value. This is also marked within the Mercantile Marine, when comparisons can be made between those who have been trained in the "Conway" and "Worcester" and brought up in companies where they are taught and encouraged, and those in other companies, where they receive no instruction or encouragement.

I submit that by combining instruction where possible with obtaining data, much good may result to seamen and meteorologists with practically no extra cost to the Meteorological Office.

I further most respectfully submit that a final decision be urged for, as to the adoption of visibility and fog scales ; they are to the seaman arbitrary. So long as he knows that they are necessary for scientific purposes and not subject to change, he will do his bit in their use. It does not appear to be of great import which scale is used, so long as it is practicable at sea, and by its means conveys some degree of precision to the computer ashore.

All these books will soon be out of print ; it is most important that we should not run short, which might cause loss of observers and valuable data.

L. A. BROOKE-SMITH,
Marine Superintendent.

9th January, 1920.

FOG SCALE.

Number.		Distance of most distant object visible.
7f	Objects not visible beyond 25 metres	13½ fathoms.
6f	" " " " 50 "	27½ "
5f	" " " " 100 "	½ cable.
4f	" " " " 200 "	1 "
3f	" " " " 500 "	2½ "
2f	" " " " 2,000 "	1 mile 1 cable.
1f	" " " " 10,000 "	5 " 4 "
0f	" " " " 30,000 "	16 " 2 "

SURFACE VISIBILITY.

Number.		Distance of most distant object visible.
0v	Objects visible up to 200 metres	1 cable..
1v	" " " " 500 "	2½ "
2v	" " " " 1,000 "	5 "
3v	" " " " 2,000 "	1 mile, 1 cable.
4v	" " " " 4,000 "	2 " 2 "
5v	" " " " 7,000 "	3 " 8 "
6v	" " " " 12,000 "	6 " 5 "
7v	" " " " 20,000 "	10 " 8 "
8v	" " " " 30,000 "	16 " 2 "
10v	V of Beaufort Scale	Above 30,000 metres.

Proof copies of the logs were submitted to the Committee for approval, and the Hydrographer asked that an opportunity might be given to the Admiralty for criticism and suggestions before the log went to press.

Exchange of Publications.—It was agreed that, as peace had now been ratified, there was no objection to the exchange of publications with enemy countries being resumed.

A proof of the following was laid on the table :—

M.O. 236. **Book of Normals,** Sections II.

825. DIRECTOR'S REPORT AND ACCOUNTS :—

Registration of Telegraphic Address.—Reported—that "Meteorology, South Kensington," had been registered as the telegraphic address of the Office at South Kensington, and that telegrams addressed "Weather, London" would be delivered at the Head Quarters at Kingsway.

Application to the County Council of Devon to replace Dartmoor.—Reported—that in view of the fact that the Governor of the Prison on Dartmoor had stated that, unless the remuneration for taking meteorological observations were increased, he would be unable to find an observer to undertake the work, a letter (M.O. 50123) had been sent to the County Council of Devon asking them to make themselves responsible for the continuance of a station at Princetown or elsewhere on Dartmoor.

Research in Anemometry.—The Sub-Committee of the Advisory Committee for Aeronautics have been engaged from time to time upon the question of the accuracy of the readings of the Robinson Anemometer at low speeds. Within recent years facilities for deciding questions of that kind, and indeed all questions concerning anemometry, have been greatly enlarged by the provision of wind channels for aeronautical research.

The most effective series of wind channels in this country are at the National Physical Laboratory, Teddington. Inquiry has been made as to whether they could undertake the examination of the Robinson Anemometer at low speeds. I have learned that there is no difficulty so far as apparatus and facilities are concerned, but that the work requires a special Assistant to whom should be entrusted the solution of that and other questions on anemometry. It is suggested that a representation should be made to the Air Council for authority to be given to the Advisory Committee for Aeronautics for the employment of an assistant in anemometry.

It would certainly be very convenient and productive if someone at the National Physical Laboratory with access to the wind channels could be charged with the duty of examining the outstanding instrumental questions in anemometry.

Approved.

Accommodation at Kingsway.—Notification has been received from Mr. McAnally through Mr. Bertram that the Office is asked to relinquish Room 425 in order that accommodation may be found for a waiting room for the Under Secretary of State. No alternative is offered for the accommodation which the Office is asked to surrender.

No alternative being available, it has been arranged that the staff provided for in Room 425 shall be transferr d to 426, and the Acting Assistant Superintendent for S.E. England should move from Room 426 to Room 312; and 314, which, with 315, was "reserved for expansion," should be

surrendered as consideration for 312. It had been subsequently arranged to use it as a library for the Marine logs in connection with the transfer of the Marine Division, and some other disposition would now become necessary.

French meteorological service.—Reported—the following extract from a letter from the Air Attaché, Paris, dated 16th January, 1920 :—

"It is intended that the French meteorological service shall consist of 25 stations, divided into three groups :—

(*a*) Central station at Le Bourget receiving atmospheric reports by W/T from England, Spain, the Azores, Iceland, &c., and centralising all information received from sub-stations.

(*b*) Six sub-stations each centralising information received from local stations, but also carrying out observations which will be forwarded to Le Bourget. By March, 1920, these will be able to furnish five reports daily at 1, 7, 9, 13 and 18 hours.

(*c*) Principal and secondary stations sending local reports to the sub-stations.

These stations will be organised in the following order :—

1. Le Bourget.
2. Sub-stations and local stations on the Paris-London and Paris-Brussels lines.
3. Sub-stations and local stations on the Toulouse-Rabat, Nimes-Nice and Marseilles-Tunis routes.

Posts in the service will be worth from four to twelve thousand francs per annum.
A meteorological school will be started at Le Bourget shortly.

ACCOUNTS.—Payment of travelling expenses of Scottish member of Committee.—In continuation of the arrangement for travelling expenses set out in Minute 3 of 31st May, 1905, it was agreed to allow the sum of £10 10*s.* for travelling expenses of the Scottish representative, so long as he resides in Edinburgh, for each meeting which he attends.

Banking Account.—By Treasury Minute of 20th May, 1905, cheques on the banking account of the Meteorological Committee were to be signed by the Director and one other member. This arrangement was subsequently modified with the consent of the Treasury and the cashier was authorised to sign cheques and subsequently Colonel Lyons as member of the Committee and Mr. R. Corless as the Director's Secretary, Treasury letter 10173/14, Minute 468.

It is now desirable to have a second signatory nearer than South Kensington, and it is therefore proposed that in place of Mr. Corless the financial representative of the Air Ministry on the Committee should sign cheques, and if that be approved that application be made to the Treasury for the necessary authority.

Approved.

Payment of travelling expenses.—Reported—that an application had been received from Mr. Skelton for the refund of £23 14*s.* 10*d.*, being the costs of moving about 13 cwt. of furniture from Eskdalemuir to Clapham Common, also £4 7*s.* railway fares for himself and his wife, and subsistence allowance for the two for one day at 3*s.* 6*d.* each.

It was agreed that the claim be allowed, subject to the necessary financial sanction.

Bank Holiday Payment.—Reported—that an application had been received asking that payment should be made for duty on Bank Holiday as for duty on Sunday, instead of allowing an alternative holiday.

It was agreed that the application should not be granted.

Letter to Colonial Office.—Reported—that, in accordance with the decision of Minute 807, a letter (M.O. 25681) had been sent to the Colonial Office stating that the Meteorological Office had a considerable stock of meteorological instruments, and asking that authority might be given for the Colonial Governments to be notified directly or through the Crown Agents that the instruments are available, and be requested to communicate with the Meteorological Office if they desire to take advantage of the opportunity.

Director's Orders for Confirmation.—Reported—the following :—

Order 954 allowing R. M. Poulter to take Army leave from November 27th to December 21st and making up his military pay to civil pay during that period.

Order 955 granting the pre-war payment of £10 per annum to the Coastguard at Pendennis Castle for the care of the anemometer. The payment to date from 1st October, 1919.

Order 956 setting out the payments to Office Cleaners as 10*s.* per week for attendance on week-days from 6 a.m. to 9 a.m. with an addition of 6*d.* per week in consideration of some Sunday work not being a repetition of week-day work.

Order 996 authorising the renewal of raingauges lent by the British Rainfall Organization to paid observers of the Organization as and when they require renewal.

Order 997 increasing the scale of payment for board and wages of the domestic servant at Valencia from £12 per year wages and 1*s.* 2*d.* per day board, to £20 for wages and 2*s.* for board.

Approved.

Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	*s.*	*d.*
Balance on the 2nd December, 1919	3,095	0	11
Receipts from 3rd December, 1919	14,834	5	10
	17,929	6	9
Cheques drawn from 3rd December, 1919	9,482	8	0
Bank balance on 27th January, 1920	£8,446	18	9

Submitted—The following Statement of Accounts for the Nine months ended 31st December, 1919, prepared for audit by the Comptroller and Auditor-General :—

RECEIPTS.							PAYMENTS.					
1918. £ s. d.		£ s. d.		1919. £ s. d.			1918. £ s. d.		£ s. d.		1919. £ s. d.	
99 14 10	Balance from year 1918–19	—		108 10 0			790 0 0	Adviser and Director...	—		880 0 0	
24,125 0 0	Parliamentary vote..	—		42,102 13 6			107 10 0	Acting Director— Col. H. G. Lyons ...	—		13 8 9	
—	Do. (British rainfall)	—		5,584 6 0				OFFICE SALARIES (including Insurance) :				
	DEPARTMENTAL EXPENSES REPAID :						10,744 14 8	Monthly	17,712 8 7			
8 7 0	Forecasts, &c ...	60 11 0					2,382 13 2	Weekly	2,154 14 3			
70 5 5	Marine, Statistical, and Administrative	85 1 5						EXPENSES OF OFFICE :			19,867 2 10	
1,182 6 5	Instruments ...	552 12 0					522 14 9	Rent, Heating, and Lighting	537 19 3			
				638 4 5			44 7 9	Furniture and Equipment	39 12 4			
	INCIDENTAL EXPENSES REPAID :						12 5 4	Library	51 14 5			
362 5 9	D.W. Report ...	670 10 1					41 5 4	Insurances and Repairs	15 0 0			
162 5 9	Divisional... ...	97 6 9					333 9 7	Incidental Expenses, and Consumable Stores	625 19 1			
14 5 3	Advertising Account	15 6 4					3 15 0	Advertising Account	—			
				783 3 2							1,270 5 1	
94 18 0	STATIONERY OFFICE	—		143 10 6			971 1 11	POST OFFICE : Postage	634 19 6			
	TELEGRAPH CHARGES REPAID	—		49 11 4			228 7 6	Telephones	132 4 4			
124 18 1							2,899 11 11	Telegrams	1,995 9 8			
	TELEPHONE CHARGES REPAID	—		110 0 5							2,762 13 6	
115 0 4							96 0 8	STATIONERY OFFICE...	—		146 0 10	
31 19 9	INSPECTIONS ...	—		144 0 0			196 9 9	TRAVELLING EXPENSES	—		294 15 2	
	INSTRUMENTS :							SUPERANNUATION :				
608 11 4	Royal Navy ...	—		—			18 15 0	Pensions not chargeable on Fund ...	3 9 10			
22,532 7 9	By Sales from Stock	—		10,258 0 9			99 1 6	Pensions chargeable on Fund	55 13 11			
	SUPERANNUATION ACCOUNT :						399 7 6	Annuities	386 5 0			
406 17 6	Annuities	401 5 0					—	Contribution to Fund	—			
49 19 4	Interest on Investments	49 19 4									445 8 9	
				451 4 4				COST OF INSTRUMENTS:			—	
							1,776 9 4	Royal Navy	—			
							21,361 10 9	For Stock	—		14,540 11 5	
	*OBSERVATORIES, BRANCHES, AND STATIONS :							*OBSERVATORIES BRANCHES, AND STATIONS :				
							1,867 13 8	Richmond	2,746 15 0			
453 7 7	Richmond... ...	580 9 8					1,486 1 6	Eskdalemuir	1,785 0 8			
1,017 12 4	Eskdalemuir ...	1,037 4 6					780 10 2	Cahirciveen	1,035 1 1			
25 18 0	Cahirciveen ...	38 17 0					636 5 3	Farnborough	604 10 6			
27 2 11	Farnborough ...	120 5 8					—	British Rainfall Org.	711 5 11			
	British Rainfall						—	Do. (Capital)	5,584 6 0			
—	Organization ...	5 0					—	Do. (Stamp)	11 5 0			
							462 19 4	Falmouth	436 4 11			
11 4 0	Falmouth	—					421 11 8	Benson	919 3 7			
—	Benson	—					—	Shoeburyness... ...	983 6 2			
—	Shoeburyness ...	—					—	West Lavington ...	243 11 9			
—	West Lavington ...	—					322 17 3	Edinburgh	383 10 9			
—	Edinburgh ...	—						Investigation of Atmospheric Pollution				
	Investigation of Atmospheric						229 4 5		364 13 7			
400 0 0	Pollution ...	237 0 0					1,375 8 8	Miscellaneous ...	1,161 8 1			
141 2 3	Miscellaneous ...	142 16 3					—	Aberdeen	306 8 8			
—	Aberdeen	—					—	Hounslow	38 5 8			
				2,156 18 1							17,314 17 4	
							1,221 12 1	Balance due to Bank on April 1st, 1919 ...	—		49 0 4	
3 0 0	National War Bonds	—		—			103 1 7	BALANCE : Cash at Bank ...	4,850 10 8			
—	Salaries refunded ...	—		2 10			131 12 7	,, at Office ...	155 10 8			
											5,006 1 4	
£52,071 9 7				£62,590 5 4			£52,071 9 7				£62,590 5 4	

* For details *see* next page.

Statement of Assets and Liabilities at 31st December, 1919.

LIABILITIES.						ASSETS.					
£ s. d.		£ s. d.				£ s. d.		£ s. d.			
—	To Admiralty	—				234 14 2	By cash at Bank and at Office ...	5,006 1 4			
9,063 14 9	,, sundry creditors	10,051 7 11				8 18 2	,, salaries reserved (premiums) ...	8 18 2			
1,236 8 6	,, Superannuation	2,226 8 6				7,979 0 10	,, M.O. Instruments in Stock ...	16,499 1 8			
1,131 0 4	,, balance	11,008 0 7				2,095 17 9	,, sundry debtors	1,674 6 0			
						1,201 12 8	,, Admiralty	97 9 10			
£11,421 3 7		£23,285 17 0				£11,421 3 7		£23,285 17 0			

NOTE.—On 31st December the amount of Government securities held for the provision of Superannuation Annuities was £26 14*s.* 2*d.* 2½ per cent. Consols, and £989 9*s.* 6*d.* 5 per cent. War Loan.

Observatory Accounts.

Statement of Receipts and Expenditure (to nearest £) during the nine months ended 31st December, 1919, with the corresponding amounts for the same period of the previous year.

Service.	Richmond.		Eskdale.		Valencia.		Farnborough.		Falmouth.		Benson.		British Rainfall Organization.		Advisory Committee on Atmospheric Pollution.		Shoeburyness.		West Lavington.		Hounslow.		Edinburgh.		Aberdeen.		Miscellaneous Stations.		Totals.	
	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.
Expenditure.	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Subventions	—	—	—	—	—	—	—	—	30	30	—	—	43	5,884	—	—	—	—	—	—	—	—	308	368	221	147	37	111	639	6,540
Cost of Forms	81	—	1	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	298	289	383	289
Salaries, Scheduled	1,544	2,447	1,100	1,298	646	891	509	565	346	269	357	706	—	386	75	242	—	970	—	241	—	38	—	—	—	101	726	711	5,303	8 865
Do. Overtime, &c. ...	24	30	—	—	—	2	—	—	—	10	—	—	—	2	30	44	—	3	—	—	—	—	—	—	—	—	—	—	54	91
Rent, Rates, Taxes, Repairs, and Insurance	37	77	14	31	47	49	—	—	29	50	—	125	—	2	—	—	—	—	—	—	—	—	—	—	—	—	7	1	134	335
Fuel and Lighting	64	96	204	256	24	22	—	—	—	—	1	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	293	377
Equipment and Instruments	9	9	7	23	8	7	45	6	—	1	4	42	—	1	—	47	—	—	—	—	—	—	—	—	—	58	4	4	77	198
Consumable Stores	51	34	19	27	8	5	1	—	—	—	39	17	—	1	2	6	—	1	—	—	—	—	—	—	—	—	—	1	120	92
Incidental Expenses	11	20	11	11	13	16	20	4	1	1	1	9	—	17	118	8	—	2	—	—	—	—	—	—	—	—	15	25	190	113
Books, &c.	4	—	15	6	11	10	2	—	1	—	1	—	—	—	4	—	—	2	—	—	—	—	—	—	—	—	1	—	39	18
Post Office Charges	36	34	36	43	21	21	53	29	54	61	17	17	—	9	—	2	—	—	—	—	—	—	—	—	—	—	24	19	241	235
Motor Car Expenses, &c. ...	5	—	81	90	—	12	6	1	2	14	1	1	—	4	—	16	—	5	—	3	—	—	15	16	—	—	—	—	110	162
Totals	1,866	2,747	1,488	1,785	781	1,035	636	605	463	436	421	919	43	6,307	229	365	—	983	—	244	—	38	323	384	221	306	1,112	1,161	7,583	17,315
Receipts.																														
Subventions :—																														
Gassiot Fund	339	567	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	339	567
Parliamentary Grant ...	—	—	1,000	1,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,000	1,000
Rosse Fund	—	—	—	—	5	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	17
Advisory Committee on Atmospheric Pollution.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	400	237	—	—	—	—	—	—	—	—	—	—	—	—	400	237
Expenses refunded locally ...	97	6	18	37	21	22	27	120	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	—	181	185
Tests and Commissions ...	8	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	—	15	7
Cost of Books and Forms ...	13	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	128	143	141	144
Totals	457	580	1,018	1 037	26	39	27	120	11	—	—	—	—	1	400	237	—	—	—	—	—	—	—	—	—	—	142	143	2,081	2,157

METEOROLOGICAL FIELD SERVICE, &c.

Statement of Receipts and Expenditure (to nearest £) during the nine months ended 31st December, 1919, with the corresponding amounts for the same period of the previous year.

Service.	France.		Dardanelles.		Met. Section R.E. (Home).		North Russian Expeditionary Force.		Totals.	
	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.
EXPENDITURE.	£	£	£	£	£	£	£	£	£	£
Salaries :										
Lieut.-Col. E. Gold ...	13	—	—	—	—	—	—	—	13	—
Major A. H. R. Goldie ...	—	—	—	—	—	—	—	—	—	—
Sergt. R. Pyser	10	7	—	—	—	—	—	—	10	7
„ E. L. Clinch ...	15	38	—	—	—	—	—	—	15	38
„ C. V. Ockenden ...	—	—	11	—	—	34	—	—	11	34
„ R. M. Poulter ...	7	—	—	—	—	—	—	30	7	30
Corpl. A. G. Goad ...	45	12	—	—	—	—	—	—	45	12
„ C. F. J. Jestico ...	16	36	—	—	—	—	—	—	16	36
Pte. W. J. Fowler ...	—	—	—	—	10	—	—	8	10	8
Incidental Expenses :										
Postage	16	—	5	—	—	—	—	—	21	—
Telegrams	—	—	756	—	—	—	—	—	756	—
Printed books	—	—	—	—	—	—	—	—	—	—
Miscellaneous	—	—	—	—	—	—	—	—	—	—
Instruments	3,044	270	579	—	946	267	—	227	4,569	764
TOTALS	3,166	363	1,351	—	956	301	—	265	5,473	929
RECEIPTS.										
Admiralty	—	—	—	—	—	—	—	—	—	—
War Office	3,753	275	623	—	868	221	—	527	5,244	1,023
TOTALS	3,753	275	623	—	868	221	—	527	5,244	1,023

HUNDRED AND FIRST MEETING.

Air Ministry, W.C. 2, 24th March, 1920.

PRESENT :

THE PRESIDENT IN THE CHAIR.

THE DIRECTOR OF THE METEOROLOGICAL OFFICE.

THE HYDROGRAPHER.	MR. MCANALLY.
LIEUT.-COL. LEWIS.	MR. MEADOWCROFT.
COLONEL LYONS.	SIR ARTHUR SCHUSTER.

DR. WEDDERBURN.

Mr. ~~Bertram~~ Bertram was in attendance.

Letters of apology on account of absence from Capt. Harvey and Sir Thomas Middleton were read.

826. The Director reported that he had agreed to continue to take charge of the Office until the arrangements for a new appointment were completed. (Minute 798.)

The Minutes 808–816 of the Meeting of 3rd December, 1919, previously circulated in revise, were taken as read and confirmed.

The Minutes 817–825 of the Meeting of the 28th January, 1920, previously circulated in proof, were corrected and confirmed.

827. CORRESPONDENCE.—**British Imperial Antarctic Expedition.**—The Director reported that he had had a visit from Capt. Wilkins, Chief of the Scientific Staff of the proposed Antarctic Expedition, which had been followed by a letter of 9th March (circulated to the Committee) asking for the co-operation of the Meteorological Office in the establishment of a complete meteorological unit, and suggesting that the Office should furnish the equipment of instruments, &c., free of cost, and detail two specialists, and three trained observers for whose salary, clothing and maintenance the expedition would be responsible. (File 25,520.)

It was further reported that neither the Admiralty nor the Royal Geographical Society had approved of the plans of the expedition, and in the circumstances it was agreed that the Meteorological Committee would not be justified in agreeing to the proposals put forward.

Cornwall Rainfall Association.—*Application for Grant from the Meteorological Office.*—Read—a letter (M.O. 26,377) from the President and Secretaries of the Royal Cornwall Polytechnic Society, and of the Cornwall Rainfall Association stating that a society—the Cornwall Rainfall Association—had recently been established for the promotion of local records of rainfall, and asking that the Meteorological Committee should assist the Association by making a grant for the provision of gauges, and for their inspection.

A draft reply, pointing out that the responsibility for obtaining records for any district lay with the local authorities rather than with the Central Office, and that therefore under the circumstances the Committee were unable to see their way to providing a grant, was approved.

Colonial Office.—*Co-operation in Meteorological Research in the Falkland Islands.*—Submitted—letter referred by the Air Council to the Meteorological Committee from the Colonial Office enclosing a copy of the Report of the Interdepartmental Committee on Research and Development in the Dependencies of the Falkland Islands, and asking for the observations of the Air Council on the sections of the Report relating to Meteorology. (File 183,676.)

The following draft previously circulated was approved :—

Draft reply to C.O. letter, 7063/1920, *20th February*, 1920.

SIR,

I AM commanded, &c., and in reply to say that the Air Council have referred the matter to the Meteorological Committee. The Committee report that they are gratified to learn that it is proposed to include a trained meteorologist in the staff of the proposed expedition to the dependencies of the Falkland Islands, and that adequate facilities would be given to him to take observations at sea and on land, and to co-operate with the observers at the Meteorological Station maintained by the Government of the Argentine Republic on Laurie Island.

Subject to the exigencies of the service, which are at the moment difficult to forsee with precision, the Committee will be glad to authorise the Director of the Meteorological Office to detail a trained physicist competent to undertake the more difficult observations at sea, and they will endeavour to secure that his experience of observations on land shall be sufficiently extensive for him to use the opportunity to discuss with the local authorities and observers at any point where he may touch, the details of organisation which form the subject of co-operation between the observers and the representatives of the Meteorological Office in this country. They particularly welcome the opportunity of such discussion with the observers in distant colonies and dependencies.

The Committee remark that they are also interested in the arrangements for the magnetic observations which are planned in paragraph 134 of the Report under reference which will no doubt be entrusted to the expert surveyors of the Admiralty. The Meteorological Office has recently been in correspondence with the Norwegian Meteorological Service concerning an international investigation of aurora in relation to terrestrial magnetism and other geophysical subjects during the next five years in connection with Amundsen's Expedition. They have recently been assured that the observations in the south polar regions simultaneous with those of our own and other countries in the north would be specially valued, and I am therefore to say that the Director of the Meteorological Office has been authorised to take up the consideration of this question with the proper authorities in connection with the proposed expedition.

It was agreed that questions of detail would have to be considered by a Committee appointed for the purpose at a later date.

Norwegian Meteorological Institute.—Reported—the receipt of a letter (M.O. 26,963) from the Director of the Norwegian Meteorological Institute enclosing a copy of a paper by Prof. Störmer on "The Importance of Systematic Photography and Observation of the Southern Lights during the English Antarctic Expedition in 1920–26."

Lettermore.—*Fishery Barometer.*—An application (M.O. 51,407) from Mr. Doherty, Schoolmaster at Lettermore, asking for the loan of a fishery barometer as the inhabitants were beginning deep-sea fishing, was approved, subject to the recommendation of the Department of Agriculture and Technical Instruction.

Italian Meteorological Society.—Reported—a letter (M.O. 27,681) announcing that an International Meteorological Meeting had been convened by the Italian Meteorological Society to take place at Venice in October and asking the Meteorological Office to communicate its adhesion.

It was agreed that the proposal to send a representative to the meeting be considered at a later date.

828. Organisation.—**Financial; Arrangements for Accounting and Postage** (Minute 819).—The Director reported that the Cashier had received a minute from the Air Ministry Cashier asking for a list of the members of the staff and their respective salaries, as the payment of the whole staff of the Meteorological Office would fall to the accounting staff of the Air Ministry on 1st April, 1920; also a minute from S.5 and S.8 (File 169,909) instructing the Postmaster-General that from 1st April letters from the Meteorological Office would go out under Air Ministry frank.

Mr. Meadowcroft reported that he had drawn up a memorandum on the accounting arrangements suggesting that there should be an overlap of a month or so between the accounting staffs of the Meteorological Office and of the Air Ministry in order to insure smooth working during the transition period. (File A. 34186.)

The Director pointed out that the analogy between the conditions of the Air Ministry and the Meteorological Office was not as complete as appeared, and cited the instances of the distinctions drawn by the Air Ministry between the staff at Headquarters and those at out-stations; a distinction that was applicable only to very few of the staff of the Meteorological Office, the majority of the staff at Headquarters being engaged upon work of the same nature as that at out-stations.

A Minute from F.M.2 on the conditions of service of the staff stationed abroad was read, stating that in the case of R.A.F. officers passage for their wives and families was only allowed for a period of service of five years, and advising that the same conditions be applied to the Meteorological Office. (File A. 39,598.)

It was agreed that in this case the analogy could not be accepted.

The question as to how the transfer of the work of accounting would affect the control of expenditure was discussed, and emphasis was laid on the necessity for the Committee to retain the executive control.

Appointment of Sub-Committee.—It was agreed to appoint a sub-committee to consider the regulations for the management of the Meteorological Office by the Meteorological Committee and to report on the modifications necessary to meet the conditions of the year 1920–21.

The following names were suggested and approved:—The Controller-General of Civil Aviation, the Director of the Meteorological Office, Mr. McAnally, The Hydrographer, Colonel Lyons, Sir Arthur Schuster, Mr. Meadowcroft.

Postage.—It was further agreed that there was no objection to the franking of the Office letters being taken over by the Air Ministry.

Instruments.—Reported—that arrangements had been made for the Office to retain its own instruments and to supply them to other Departments on requisition, but that the Office should draw on the Director of Equipment for instruments such as watches, &c., which are not definitely meteorological. (File A. 49634.)

Approved.

829. Programme and Estimates.—**Report of Finance Sub-Committee** (Minute 811).—Submitted—the following:—

SECOND MEETING OF FINANCE SUB-COMMITTEE.

3rd February, 1920, *Air Ministry, W.C.2.*

PRESENT :

THE DIRECTOR IN THE CHAIR.

MR. BERTRAM. | COLONEL LYONS.

MR. MEADOWCROFT.

The following also attended :

MR. BARNES, S.1. | MR. HEATH, F.P.1.
MR. JENKINS, S.1. | MR. SPAIGHT, F.M.2.

MR. YOUNG, S.2.

1. The scales of salaries for Professional Staff referred by the Committee were considered and the suggested scales were altered to the following :—

Grade.	Suggested Salary.
Assistant Director (H.Q. or Observatory)	£700—£25—£800 + War Bonus.
Superintendent (H.Q. or Observatory)	£350—£25—£650 + War Bonus.
Assistant Superintendent (H.Q. or Observatory) Meteorologist or Physicist I.	£350—£15—£470 + War Bonus.
Senior Professional Assistant Meteorologist or Physicist II. ...	£250—£15—£350 + War Bonus
Junior Professional Assistant Meteorologist or Physicist III.	£200—£15—£245 + War Bonus.

Note.—1. The salaries are suggested on the assumption that Pensions for permanent staff on Civil Service Scales would be added, or in lieu thereof pay for endowment assurance.

2. An Assistant Director in charge of one of the principal observatories may receive an addition of £50 a year and take the title of Director of the Observatory.

The clerical and technical staff was considered and the following minute agreed to :—

"The clerical staff at Headquarters may be recruited on the Civil Service grades, but a special service of interchangeable technical staff is required for the out-stations."

Reference was made to the paragraph in Treasury letter 52589/19 pointing out that some salaries in Enclosure B exceeded the pre-war scale plus the latest Civil Service war bonus. It was explained that the formation of a regular professional staff for the Meteorological Office only began in 1913 and as the Committee worked on a fixed grant-in-aid no comprehensive scheme could be framed beforehand with the necessary provision for extended duties and responsibi ities which during the war exceeded all anticipations.

2. *Major Hearle's requests concerning the Malta Service :* (Minute 822)—Agreed as follows :—

1. All members of the "professional staff" and the "observing staff" are liable, if necessary, for service abroad. For the small number of establishments abroad the number of volunteers is generally sufficient.
2. That the period of service at (Malta) be three years.
3. That the staff (with their wives and families) be given free passage to (Malta) and home again not more than once in three years, provided that if a member of the staff leave the service for an appointment outside the service before the termination of three years the passage money be refunded.
4. Annual leave should be cumulative for not more than two years out of three.

It was mentioned that a Committee was reporting upon salaries of the new consular service and overseas trade which might indicate the lines for corresponding staff of the Meteorological Service.

Approved.

Estimates, 1920–21 (Minute 820).—Submitted also—the estimates for the Meteorological Office for 1920–21 included under votes 5C and 8G of the vote for Civil Aviation.

The following figures are taken from the Estimates (37) presented to Parliament 5th March, 1920 :—

Vote 5C.—METEOROLOGICAL OFFICE—

	£	£
Headquarters : Cost of Staff, &c.		56,161
[Salaries	53,161	
Rent, Rates, &c.	900	
Equipment	1,000	
Incidental Expenses	1,100]	

Vote 8 G.—METEOROLOGICAL SERVICES—

—	Salaries (*see* Schedule, Min. 800 and 811).	Instruments and Stores.	Rent, Fuel and Incidental Expenses.	Transport.	Buildings.	Thunderstorm Inquiry.	Maintenance of Kite-Balloons.	Subventions.	Totals.
Contributive Stations:	£	£	£	£	£	£	£	£	£
Kew	4,150	280	300	—	—	—	—	—	4,730
South Farnborough	2,360	220	115	—	—	388	—	—	3,083
Falmouth	419	115	155	—	—	—	—	—	689
Benson	1,798	170	80	—	—	—	—	—	2,048
Holyhead	929	120	90	—	400	—	—	—	1,539
Scilly	955	120	165	—	400	—	—	—	1,640
Valencia	2,420	190	145	—	—	338	—	—	3,093
Aberdeen	1,408	120	150	—	—	238	—	295	2,211
Eskdalemuir	3,185	224	506	—	—	—	—	—	3,915
Lerwick	942	150	120	—	400	—	—	—	1,612
Auxiliary Meteorological Stations:									
Telegraphic, &c.	1,000	—	—	—	—	—	—	—	1,000
Armagh	—	—	—	—	—	—	—	50	50
Southport	—	—	—	—	—	—	—	50	50
Fleetwood	—	—	—	—	—	—	—	10	10
TOTAL	19,566	1,709	1,826	—	1,200	964	—	405	25,670
Distributive Stations:									
Croydon (Waddon)	1,210	180	55	—	400	—	—	—	1,845
Lympne	1,210	110	55	—	—	—	—	—	1,375
Felixstowe	1,210	115	45	—	—	—	—	—	1,370
Grain	1,210	85	45	—	—	—	—	—	1,340
Andover	1,210	115	55	—	400	—	—	—	1,780
Calshot	2,399	180	90	—	—	—	—	—	2,669
Howden	1,850	180	80	—	—	—	—	—	2,110
Cranwell...	2,014	180	80	—	—	—	—	—	2,274
Didsbury	1,210	115	55	—	400	—	—	—	1,780
Cattewater	2,014	180	80	—	—	—	—	—	2,274
Baldonnel	2,014	180	80	—	—	—	—	—	2,274
Orkney	1,236	115	100	120	400	—	—	—	1,971
Malta	2,500 +275	210	90	200	—	—	—	—	3,275
Shoeburyness	2,855	200	—	—	600	—	1,500	—	5,155
Larkhill	1,405	120	80	—	—	—	—	—	1,605
Glasgow	575	20	140	—	—	—	—	—	735
Liverpool	575	20	140	—	—	—	—	—	735
Edinburgh	2,430	—	500	—	—	—	—	—	2,930
Biggin Hill	668	180	40	—	—	—	—	—	888
Guernsey (or Jersey)	668	150	150	—	400	—	—	—	1,368
TOTAL	30,738	2,635	1,960	320	2,600	—	1,500	—	39,753
Colonial Stations:									
St. Helena	10	—	—	—	—	—	—	—	10
Ascension	640	265	50	100	—	—	—	—	1,055
Bermuda...	203	30	150	20	—	—	—	—	403
TOTAL	853	295	200	120	—	—	—	—	1,468
Experimental Stations:									
Ditcham Park	—	—	—	—	—	238	—	—	238
Fifeness	—	—	60	—	—	—	—	—	60
St. Abb's Head	—	—	60	—	—	—	—	—	60
TOTAL	—	—	120	—	—	238	—	—	358

—	Salaries (*see* Schedule, Min. 800 and 811).	Instruments and Stores.	Rent, Fuel and Incidental Expenses.	Transport.	Buildings.	Thunderstorm Inquiry.	Maintenance of Kite-Balloons.	Subventions.	Totals.
Miscellaneous:									
Superannuation	—	—	—	—	—	—	—	—	2,080
Transport and Subsistence ...	—	—	—	[illegible]	—	—	—	—	1,000
Postage, Telephones, &c. ...	—	—	—	—	—	—	—	—	6,700
British Rainfall Organization ...	—	—	—	—	—	—	—	—	300
Atmospheric Pollution ...	—	—	—	—	—	—	—	—	300
TOTAL	—	—	—	—	—	—	—	—	10,380
Summary, Vote 8 G:									
Contributive Stations	19,566	1,709	1,826	—	1,200	964	—	405	25,670
Distributive Stations	30,738	2,635	1,960	320	2,600	—	1,500	—	39,753
Colonial Stations	853	295	200	120	—	—	—	—	1,468
Experimental Stations ...	—	—	120	—	—	238	—	—	358
Miscellaneous	—	—	—	—	—	—	—	—	10,380
TOTAL	51,157	4,639	4,106	440	3,800	1,202	1,500	405	77,629
Vote 5 C.									56,161
TOTAL VOTES FOR METEOROLOGY									133,790

VOTE 8 H.—APPROPRIATIONS IN AID—

4. Receipts of Meteorological Service—

	£
Royal Society	400
Expenses Refunded	1,785
Inspections (Transport)	300
Superannuation	604
	3,089

Reported—the following Treasury letter 6725/20 enclosing a statement of the scale of salaries approved by the Committee on Salaries of Scientific and Technical Officers for the staff of the Meteorological Office.

6725/20.

Treasury Chambers,
20th March, 1920.

SIR,

I HAVE laid before the Lords Commissioners of His Majesty's Treasury Mr. Webster's letter of the 10th ult. (A. 42512/S.1) further respecting the proposed establishment of the Meteorological Office.

I am directed by the Lords Commissioners of His Majesty's Treasury to transmit herewith for the information of the Air Council a copy of a letter, dated the 23rd ultimo, with enclosure which they have received from the Committee on Salaries of Scientific and Technical Officers, on the subject of the remuneration of the scientific staff of this office. The Council will observe that the scales of pay recommended are somewhat higher than those suggested by them as minimum rates, and that the estimated cost of the scheme originally submitted falls to be increased accordingly.

My Lords approve of the scales recommended by the Committee, which it is understood the Council wish to adopt.

Unless the Council desire to modify their original scheme in view of this addition to its cost, My Lords sanction the proposals, including those fixing the rates of pay of the technical staff, set out in Mr. McAnally's letter of the 6th December last, and the enclosures thereto.

I am, however, to add that the increased expenditure on Meteorology involved in these proposals, to which further additions are proposed in future, is so heavy that if and when the eight further distribution stations referred to in the letter under reply are instituted, My Lords think that some rearrangement of existing stations, involving a reduction of the total number, might be possible, and My Lords trust that this question will be carefully explored.

I am, &c.,
R. S. MEIKLEJOHN.

The Secretary,
Air Ministry.

SIR, 23rd February, 1920.

1. I AM directed by the Committee on the Salaries of Scientific and Technical Officers, to refer to Treasury letter of 16th ultimo (61589/19) and I am to state for the information of the Lords Commissioners of His Majesty's Treasury, that the Committee on the salaries of Scientific and and Technical Officers have now considered the question of the proposed establishment of the Meteorological Office under the Air Ministry. A copy of the letter received from that department and also of the minimum rates suggested by the Air Council is enclosed, and I am to transmit a schedule showing the rates of pay recommended by the Committee.

2. The Committee's recommendations are based on the rates of salary already authorised or now proposed for other Government Institutions engaged on Scientific Work, and they correspond closely with those put forward by the Air Council.

3. It will be observed, however, that the Committee recommend a somewhat higher scale for the Superintendents than that proposed by the Air Council, but they consider that the rate now proposed is justified by the duties to be assigned to the Superintendents, who are directly responsible either for important Sections at Headquarters, or for important Stations.

In the case of the Assistant Superintendents the Committee recommend a slight improvement in the scale in conformity with the rates in other Government Research Institutions.

For the Junior Professional Assistants they have suggested the same rate of salary as that of the Junior Assistants at the National Physical Laboratory, which they consider to be appropriate.

I am, &c.,
E. E. BRIDGES,
Secretary of the Committee on the Salaries of Scientific and Technical Officers.

The Secretary,
H.M. Treasury.

METEOROLOGICAL OFFICE.

	£
Director	1,200
Assistant Directors	700-25-850
(£50 allowance in addition to Directors of Observatories).	
Superintendents	550-25-700
Assistant Superintendents	350-20-500
Senior Professional Assistants	250-15-350
Junior Professional Assistants	175-15-235

The above to have, in addition, the full Civil Service war bonus. It is proposed that the staff should be *unestablished*, and pensionable under the Universities Scheme of Superannuation. 10 per cent. of total salary will be paid by the Government to the Superannuation Fund, in addition to the above inclusive salary, and 5 per cent. will be paid by each officer out of his salary.

It was agreed that the scale of salaries should become operative on 1st April, 1920, and the Director was requested to draw up, for submission to the Treasury, a list of the salaries payable to members of the staff which would preserve their seniority within the several grades.

It was further agreed that, in view of the difficulty of anticipating at which stations the staff would be most urgently required, application should be made to the Treasury for general authority to distribute the staff at the various stations as might from time to time become desirable, on the understanding that the total numbers employed would be covered by the number mentioned in the estimates.

Establishments of Meteorological Station at Bermuda.—Read—the following letter from the Hydrographer :—

N.M.S. 29/1920.—M.O. 26,050.

Hydrographic Department,
Admiralty, S W.1,
7th February, 1920.

SIR,

I BEG to bring to your notice the necessity for the establishment of a first class Meteorological Station at Bermuda Island, which with the use now being made of the Panama Canal route has become of increased importance.

During the early part of December last year a steamboat of one of H.M. Surveying Ships, working at Bermuda, was lost through a gale which sprang up without warning, serious loss of life being narrowly averted ; a Court of Inquiry mentioned the fact that no warning was given by the barometer.

From this it would appear that no forecasts of the weather to be expected were received at Bermuda. It is understood from verbal information received from the Colonial Office that there is a station on the Island, provided for out of Colonial funds ; but it does not appear that any provision is made for the distribution of forecasts, nor that any trained meteorologists are employed at the Station.

As it is obvious that Bermuda is of great importance from the point of view of meteorological science, it is suggested that trained meteorologists should be employed at this Station, and local forecasts issued as well as synoptic messages for the benefit of other stations interested.

I am, &c.,
F. LEARMONTH,
Hydrographer.

The Director,
Meteorological Office.

Submitted also—the following memorandum (File 26050) by the Assistant Director in charge of contributive stations :—

Note on Meteorological Work at Bermuda.

A Meteorological Station was set up by the R.E. in Bermuda about 1850, and subsequently transferred to the Royal Army Medical Corps. Summaries of the results have been published. Observations have been continued under various authorities. The history of the station during recent years may be summarised as follows :—

In 1907 the Colonial Office, at the suggestion of the Metebrological Office, circulated a despatch to all Crown Colonies regarding the arrangements made for taking meteorological observations and making available the results. In reply to this the Colonial Government reported that the Canadian Department of Marine and Fisheries maintained a meteorological station with the aid of the Military Authorities at Prospect, the Military Cantonment near the city of Hamilton. Daily reports were telegraphed from this station to Toronto and Washington. The observations were taken under the direction of the Principal Medical Officer of the Royal Army Medical Corps. The instruments, which comprised the ordinary outfit of a climatological station and an electric anemograph, were the property of the Colonial Government or of the War Office. The cost of maintenance was stated to be £40 per annum, of which sum only £10 was contributed by the Colonial Government, from the "Powder Commutation Fund," in return for a weekly climatological summary for publication in the Gazette. The remaining £30 was presumably received from Canadian sources.

In addition, there was, under the control of the Colonial Authorities. a climatological station at Gibb's Hill Lighthouse in the western portion of the islands, from which returns do not appear to have been published. A third station was kept at the Public Library, Hamilton, returns for this were published in the annual Blue Book.

As a result of correspondence with the Office the form of presentation of the results from Prospect Hill, Hamilton was improved. A schedule of daily observations in the approved international form is printed, and 100 copies of this are sent to the Meteorological Office for distribution to Meteorological Libraries and Institutions.

In 1909 notice was received that the Colonial Government had made provision for defraying the cost of the upkeep of the station from Colonial Funds. Presumably the contribution from Canadian sources then ceased, but daily observations are still communicated by cable to Toronto. The details of the arrangement between the Colonial Government and the Canadian Meteorological Service are not known here. Since 1909 occasional correspondence on questions of detail has passed between the Meteorological Office and the Principal Medical Officer of the Royal Army Medical Corps, who is still responsible for the taking of the observations.

In addition to the station at Prospect the Admiralty caused a set of instruments to be issued to Bermuda Dockyard about the year 1893. These appear to be in charge of 1st Lieutenant, H.M.S. "Terror." Daily readings taken at Noon G.M.T. were formerly sent to the Office on the Admiralty form S376, but nothing has been received since 1912. In that year arrangements were made by the Officer in charge of the meteorological work of H.M.S. "Terror" for incorporating in the printed schedules, prepared by the Colonial Government from the observations at Prospect Hill, daily observations of fog and sea disturbance taken at St. David's Lighthouse, and the forwarding of reports from the Dockyard station to the Meteorological Station ceased. It is not known whether the observations are being continued.

The present position would therefore appear to be that there is an efficient climatological station maintained by the Colonial Government, in charge of the Principal Medical Officer of the Royal Army Medical Corps, from which observations are cabled each day to Toronto and probably also to Washington. It is not the function of such stations to take part either in the investigation of the upper air, or still less to issue anything in the nature of gale warnings.

The importance of obtaining regular data for the upper air from a station, situated as Bermuda is in Mid-Atlantic, does not need to be urged. A professional meteorological establishment would naturally include pilot balloon observations and other upper air work in its programme. The question of the issue of gale warnings is not entirely a local one. A professional meteorologist stationed at Bermuda would require regular and full reports from the American Continent and the West Indies and also from ships at sea, if he is to attempt anything in the nature of gale warnings. Unless these facilities were afforded the Meteorological Service of Canada or the United States would be in a much more favourable position to attempt the enterprise. The United States Weather Bureau maintains an elaborate organisation for the issue of warnings of West Indian Hurricanes and in view of the geographical position of Bermuda, a Bermuda Weather Service would have to rely on much the same material for the issue of its warnings.

The synoptic wireless messages already issued by the Washington and Canadian Authorities, or about to be issued by them and the wireless reports from ships now being organised would provide a considerable part of the information that would be needed. It is probable that wireless installations already exist in Bermuda which could receive these messages. A meteorological establishment on the lines of those contemplated at distributive stations in this country could thus do useful work. For effective working two professional meteorologists would be almost a necessity, as the great distance of Bermuda makes it impossible to send a substitute to carry on during temporary interruptions at short notice.

The expenses of such service may be estimated as follows : —

	£
Cost of Instrumental Outfit including Pilot Balloon Outfit	300
Fixing and transport, etc.	100
	400

	£	
Brought forward	400	
Salaries:—		
Assistant Superintendent	550	
Professional Assistant	375	
4 Technical Assistants at £150	600	
Upkeep of Instruments including consumable stores for Pilot Balloon work	100	
Contribution to expense of Wireless Station for work done in connection with receipt of messages	150	
Contingencies	50	
Annual Charges	1,825	Say £2,000

The expenditure on the instrumental outfit might be reduced, if the Colonial Government would place the instruments already at Bermuda at the disposal of the proposed new observatory. On the other hand, the estimate includes no charges for the rent of the premises; it assumes that the Colonial Government or other authority, would be able to provide the necessary office and observing premises.

13*th March*, 1920.

It was agreed that it was desirable if possible to establish a station on the island, and approval was given to the project in principle, if the necessary personnel could be provided.

Co-operation with Amundsen's North Polar Expedition (Minute 793 and 807).—Reported—a letter (M.O. 26,673), from the Royal Society, enclosing the following resolution adopted by the Royal Society, on the recommendation of the National Committee on Geodesy and Geophysics :—

"That the information before the Committee is not sufficient to convince them that they could justify an application to the Government for the large funds necessary to send an expedition to Jan Mayen and maintain it there for two years. The Committee is, however, of opinion that the establishment in the Shetland Isles of a station for meteorological, magnetic and auroral observations might be of considerable use in assisting the Norwegian expedition, and would also be of value if permanently established. They therefore recommend the establishment of such a station."

Submitted—the following memorandum by the Assistant Director in charge of Contributive stations on the proposed geophysical observatory at Shetland.

PROPOSED GEOPHYSICAL OBSERVATORY IN SHETLAND.

The proposal to co-operate with the Norwegian Polar Expedition by sending a British Expedition to Jan Mayen having been withdrawn, the following suggestions are submitted in connection with the alternative scheme for the establishment of an observatory in Shetland :—

Investigations to be undertaken.

(*a*) Photography of aurora for determination of parallax.
(*b*) Continuous magnetic records (three elements). Absolute magnetic observations.
(*c*) Normal meteorological observations.
(*d*) Atmospheric electricity. Continuous record of potential; observations ionic charges and air-earth current,
and if facilities can be obtained
(*e*) Vertical force pulsations.
(*f*) Earth current observations.
(*g*) Spectrum of aurora.
(*h*) Influence of aurora on wireless.

Site.—The site must be magnetically undisturbed. For the observations of auroral parallax a subsidiary station, distant 10 to 25 kilometres from the principal station, is necessary, but need be habitable only on nights of observation. If suitable for the magnetic and auroral observations (which is rather doubtful) Lerwick has obvious advantages. Balta Sound has scientific traditions and residential facilities, but magnetically considered the island of Yell seems the most promising site. Inspection of the sites is a necessary preliminary to a satisfactory decision.

Staff.—The following staff is suggested :—

	£
1 Superintendent	725
1 Professional Assistant	425
2 Staff Assistants	600
1 Boy Clerk (recruited locally)	52

The second Staff Assistant would be required only during the auroral season (say five months).

Total, £1,802. Air Ministry Estimates, 1920–21, contain an entry of £942 for salaries and wages for the proposed contributive station at Lerwick.

Instruments.—The following are available or can be rendered available after repair without incurring great trouble or expense :—

Normal meteorological equipment from Office stock.
Krogness magnetographs (on order) or magnetograph formerly used at Falmouth.
Insulated cable for vertical force pulsations and earth currents: considerable length still available at Eskdalemuir.

Post Office box could also be borrowed from Eskdalemuir.
A Kew Pattern magnetometer could be supplied for absolute magnetic observations, but it is old and would require complete overhaul. A new instrument would be more satisfactory. A dip circle could be supplied from stock

The following would have to be provided :—

Photographic outfit similar to that used by Professor Störmer. (Inquiries are being made.)
Instruments for observations of atmospheric electricity.
Galvanometers for earth current observations.
Pendulum clock.
2 Chronometers, etc.

It is estimated that a sum of about £750 would be required for instrumental equipment; detailed estimates have not yet been obtained. Air Ministry Estimates, 1920–21, allot £150 for instruments and stores at the proposed contributive station at Lerwick.

No estimate of the expenses likely to be incurred in housing the observatory can be framed until further progress has been made with the question of site. Air Ministry Estimates, 1920–21, allot £120 for "Rent, Fuel, and Instrumental Expenses," and £400 for "Buildings, Works, etc.," for the contributive station at Lerwick.

23rd March, 1920.

Reported also—a letter (M.O. 27,330) from the Norwegian Meteorological Institute emphasising the value of observations from the Shetland Islands in co-operation with the North Polar Expedition.

Approval was given to the establishment of a station in Shetland, and it was reported that if the Treasury agreed to the principle of transferring the personnel from station to station it might be possible to provide the necessary staff for the establishment in Shetland by diverting some of the personnel provided for Eskalemuir or Aberdeen.

Proposals for Auxiliary stations reporting to Local Centres.—Read—the following memorandum by the Assistant Director in charge of Forecasts. (File 26,693) :—

Provision is required for additional reporting stations in the different areas for the local meteorology of which the meteorologists in charge of local centres are responsible.

It is estimated that £100 per annum for each of the six areas in England and Wales, for two areas in Scotland, and for two areas in Ireland, making a total of £1,000 per annum in all, will be sufficient for this purpose, apart from the cost of communications.

One such station has already been started at Beachy Head, as it was essential in connection with the reports for aviation from London to the Continent.

Another station is now required at Flamborough Head, primarily in connection with the flights of airships from Howden over the North Sea.

There is a coast-guard station at Flamborough Head, and it is proposed, with the concurrence of the Admiral Commanding Coastguards and Reserves, to utilise the services of the coastguards for the Meteorological Reports from Flamborough.

Further stations will be required as the organisation of the different areas proceeds.

5th March, 1920.

The proposal was approved subject to financial sanction.

Provision of Kites at Distributive Stations.—Reported—a letter (M.O. 26,710) from the Meteorological officer at Pulham, asking that a kite outfit for upper air observations might be supplied.

The President reported that there would be no difficulty in obtaining the necessary authority from C.A.L. if the site selected were over three miles from a danger flying zone.

It was agreed to take steps to obtain the necessary authority.

War Office requirements (Minute 820).—Reported—that a letter (M.O. 26,338) had been addressed to the War Office setting out the decisions of the last meeting, and also proposing a scheme for the provision of meteorological instruction at Larkhill, but that no reply had yet been received.

Balloon Investigations.—The Director raised the question of the facilities for balloon observations on the ground that much valuable information about the upper air could be obtained from free spherical balloons.

It was agreed that the matter should be taken up with the Director of Airships.

830. Office Staff.—**Superannuation** (Minute 821).—Submitted—that in accordance with Treasury circular 2444/20 of 13th March, the following amounts were payable

by way of pension to the members of the staff who retired on 31st December, 1919, or who were due to retire on 31st March, 1920 :—

	£	s.	d.
F. J. Brodie...	210	0	0
W. G. James	140	0	0
J. Sheerman	166	12	0
T. D. Bell	210	0	0
H. Harries	220	0	0

Submitted also—letters from Mr. Curtis and Mr. Harries, asking that further consideration by way of pension might be granted them.

It was agreed that the most favourable terms possible should be obtained for the staff, and Mr. McAnally undertook to obtain the necessary authority for payment, and to take up the questions raised by Mr. Harries' and Mr. Curtis' letters.

Director's Orders for Confirmation.—Reported the following :—

New Appointments.—1018 appointing **W. A. Bion** (Minute 824) for temporary duty at the British Rainfall Organization on the terms of Minute 824. The appointment to date from 3rd February, 1920.

1046 attaching **Reginald Harold Mathews** junior professional assistant to the Forecast Division, during the six months for which his services are lent by the Board of Customs and Excise as from 9th February (Minute 782).

1004 appointing **Gordon Robert Gentleman** technical assistant at a salary of £75 per annum, with war bonus of 20 per cent. of basic salary plus £60 as from 2nd February, 1920.

1020 appointing **A. N. Maud** temporary research chemist at a salary of £250 per annum from 4th February, 1920, in place of G. M. Watson, still in hospital.

1023A appointing **F. W. Beaver** technical assistant at a salary of £75 per annum with war bonus as set out in letter 25948/20, the appointment to date from 11th February.

1027 and 1049 appointing **F. L. McCreary** technical assistant at a salary of £75 per annum, with war bonus as set out in letter 25950 as from 4th March, 1920.

1037 appointing **Sydney Lewis King** boy clerk at a salary of 14*s.* 6*d.* per week, with normal war bonus, as from 23rd February, 1920.

1045 appointing **Robson Graham** boy clerk at a salary of 17*s.* 6d. a week, with normal war bonus, as from 1st March, 1920.

1048 appointing **Arthur James Wallis** boy clerk at a salary of 16*s.* a week, with normal war bonus, as from 8th March, 1920.

1005 appointing **William Hogg** mechanic at Eskdalemuir Observatory at a salary of 45*s.* a week plus war bonus of 17*s.* a week, with free quarters. The appointment to date from 7th January.

Resignation.—The resignation of **A. N. Maud**, temporary research chemist for the investigation of atmospheric pollution, is accepted as from 7th April, 1920 (Order 1058).

Termination of Appointment.—The appointment of **F. W. Beaver**, technical assistant in the Forecast Service, terminated on 15th March, 1920 (Order 1062).

Promotion and Increase of Salary.—1017 promoting **C. S. Herbert** to clerk computer as from 22nd September, 1919, on his resuming duty after service as sapper in the R.E. (Minute 801).

1021 promoting **A. C. Lloyd**, probationer, to technical assistant, as from 9th February on his transfer to Shoeburyness (Minute 654).

1035 promoting **W. A. Toms**, boy clerk, to probationer at a salary of £1 per week as from 5th January, 1920, upon his satisfying the requirements by the Senior Local Examination, Cambridge.

1036 authorising the Meteorologist-in-Charge at South Farnborough to increase the wages of **Miss I. M. Brierley**, supernumerary clerk, to 47*s.* 6*d.* per week (25*s.* plus normal war bonus) as from 16th February, 1920 (Minute 742).

1052 transferring **F. C. Levin**, clerk computer, from South Farnborough to the Marine Division, with promotion to clerk assistant, as from 23rd March, 1920 (Minute 782).

1053 transferring **W. J. Fowler**, boy clerk, from Falmouth to South Farnborough with promotion to clerk computer, to date from 22nd March, 1920 (Minutes 716 and 801).

1060 increasing the wages of **Mrs. Hampton**, housekeeper, British Rainfall Organization, from 12*s.* to £1 per week as from 1st April, 1920.

1061 increasing the wages of **J. Oliver**, boy assistant, from 15*s.* to 25*s.* a week as from 1st April, 1920.

Approved.

Scale of Salaries of Clerical Staff.—Submitted—the following comparison of the scale of salaries for the clerical staff drawn up by the Reorganisation Committee of the Whitley Council of the Civil Service, and those at present payable to the staff of the Office :—

CLERICAL STAFF.

REORGANISATION of the SCALE of PAYMENTS of the OFFICE STAFF to BRING it into AGREEMENT with the PROPOSALS of the REPORT of the REORGANISATION COMMITTEE of the CIVIL SERVICE NATIONAL COUNCIL.

Grade of the Reorganization Committee.	Corresponding Grade of the M.O. Staff.
Writing Assistant— Age of entry. 16–17. Salary (exclusive of war bonus) 18*s.*, 2*s.*, 36*s.* Annual Leave. For first 5 years : 18 working days. After 5 years : 21 working days. Hours. 7 a day. ¾ hour for luncheon; ¼ hour discretional. Overtime. Payment for overtime in excess of 42 hours.	*Boy Clerk*— Age of entry. 15–17. Salary 12*s.* 6*d.* to 15*s.* 6*d.* per week, by 1*s.* 6*d.* to 20*s.*, with additional 2*s.* a week in London area. Annual leave. 14 working days. Not retained after age of 21, except by appointment into other grades when suitable. *Supernumerary Clerk*— Salary £52—£2 10*s.*—£90. Annual Leave (if salary less than £60) 14 days. (if salary £60 or more) 24 days. Hours. 8 a day. Half-day on Saturday.
Clerical Class— Age of entry. Boys 16–17. Girls 16½–17½. Salary (exclusive of war bonus) £60. Men. Women. £ £ Salary at age of 18 ... 80 80 (rising by £5 annually) Salary at age of 22 ... 100 (rising by £10 annually) by £5 annually. Salary at age of 24 ... 120 (rising by £15 annually). Salary at age of 26 ... 150 120 (rising by £10 annually) by £7 10*s.* Salary at age of 36 ... 250 180 (at 34). Annual Leave. 24 working days. Overtime as for writing assistant.	*Boy Clerk* (see above)— Leading to Clerk Computer, Clerk, or by merit to Staff Assistant or Principal Clerk. Salary on promotion from Boy Clerk £75—£7 10*s.*—£150. Annual leave after promotion from Boy Clerk 24 days. Hours. 8 a day. Half-day Saturday. [*Overtime.* Beyond 44 hours generally paid at one and a half rates. Double rates for Sunday work and night work in the Forecast Division.]
Higher Grade— With a scale of salary (inclusive of overtime) for men ranging from £300 a year by annual increments of £15 to a maximum of £400, and for women from £250 by annual increments of £10 to a maximum of £300. Annual Leave. 36 working days. Hours, as for writing assistant.	*Staff Assistant.* Salary. £175—£7 10*s.*—£200. *Principal Clerk.* Salary. £225—£7 10*s.*—£275. Annual Leave. 24 days. Hours. 8 a day. Half-day Saturday.
Executive Class— Age of entry— For men ... 18–19. Secondary school „ women ... 18–25. course. Salaries. *Training Grade*—Men £100—£10—£130—£15—£400 Women £100—£10—£300 Annual Leave. 36 working days. Hours as for writing assistant.	*Probationer*, leading to Clerk Assistant, Staff Assistant and Principal Clerk. Salary of probationer. At age of 17 17*s.* per week ... (With additional 2*s.* in London Area.) „ „ 18 18*s.* 6*d.* per week „ „ 19 20*s.* per week ... On 31st March following 20th birthday, promoted. *Clerk Assistant.* Salary. £75—£7 10*s.*—£150. *Staff Assistant.* Salary. £175—£7 10*s.*—£200. *Principal Clerk.* Salary. £225—£7 10*s.*—£275, exceptionally . £300.
Executive Class (on promotion from training grade)— Salaries. Men £400—£15—£500. Women £300—£15—£400. Annual Leave. 48 working days after 15 years service in grade carrying 36 days.	*Chief Clerk*, By promotion from Principal Clerk, with a special maximum of £330 per annum. Hours. 8 a day. Half-day Saturday.

Grade of the Reorganization Committee.	Corresponding Grade of the M.O. Staff.
Administrative Class— 1. Age of entry ... Men 22-24 Women 22-30 by a selection board. Salary (inclusive of overtime)— Men Cadets. £200—£20—£240. £25—£500. Women Cadets. £200—£20—£400. 2. *When recruited from other classes*— Men. £400—£15—£500. Women. £300—£15—£400. Annual Leave. For first 10 years 36 working days. After 10 years 48 working days.	*Professional Assistants.* *Junior* Salary £250—£25—£350 (inclusive of war bonus). *Senior* after 5 years as Junior. Salary £375—£15—£475 (inclusive of war bonus). Annual Leave. 24 working days. No corresponding grade.
Typists— Age of entry. 18–28. Wages. Age 18 to 19 22*s.* At 19 24*s.*, rising by 2*s.* annually to 36*s.* Entrants over 21 commence at 28*s.* Annual Leave. First 5 years 18 working days. After 5 years 21 working days. *Shorthand Typists*, recruited from established typists of not less than one year's service. Wages 28*s.*, 2*s.* 6*d.*, 46*s.* Annual Leave. First 5 years 21 days. After 5 years 24 days. Superintendents £150—£7 10*s.*—£180. Annual Leave 24 days.	Work done by Boy and Girl Clerks and Probationers.
Higher Staff—Classes above £500 a year not dealt with.	Asst. Superintendent, Superintendent, Asst. Director.

It was agreed that the matter should be taken up when the general instructions based on the findings of the Committee had been issued.

Forecast Division.—*Rates of Pay.*—Read—a memorandum (M.O. 26504) from certain members of the staff of the forecast division drawing attention to the anomalous conditions resulting from the adoption of a new scale of pay for professional assistants.

It was agreed that as the question of salaries would be regularised under the new scheme, no action was necessary.

S.1. Payment of Health Insurance by newly appointed staff.—The question as to whether the newly appointed staff were covered by the Certificate of Exception held by the Office was discussed. (File 170268/20.)

It was agreed that a sub-committee be appointed to consider this and similar matters of detail.

Travelling expenses and subsistence allowances.—The general scheme set out by F.M.2 was accepted, but it was agreed that certain matters of detail would require consideration by the sub-committee. (File 26432.)

Position of the Meteorological Office staff under the Air Ministry.—Read—a letter (M.O. 26944) from Mr. Skelton (Minutes 630 and 754) asking for information as to whether, if the clerical staff became established civil servants, it would still be possible to be promoted from grade to grade of the staff, and to be transferred to the professional staff on obtaining the necessary qualifications.

It was understood that no disability of that kind existed: Mr. McAnally undertook to look into the questions raised in the letter.

Salary List.—The following promotions and increases of salary were approved to take effect on 1st April, 1920:—

Promotions.

To be *Assistant Superintendents* (Minutes 812 and 820).

R. Sargeant.
E. G. Bilham.
E. V. Newnham.
C. E. P. Brooks.
R. A. Watson Watt.
L. H. G. Dines, J.P.

To be *Senior Professional Assistants.*

R. P. Batty (Minute 765).
R. A. Watson (Minute 765).
C. E. Britton (Minute 782).
J. Glasspoole (Minute 773).
C. S. Durst (Minute 782).
R. M. Stanhope (Minute 782).

To be *Chief Clerk*, vice T. Duncan Bell, superannuated, **H. L. B. Tarrant** (Minute 754). This promotion carries with it a pre-war salary of £300 per annum, with a maximum of £330.

On probation as assistant at Kew or Benson or other Observatory with a view to appointment as *Junior Professional Assistant* in consideration of his having graduated as B.Sc. in Physics and Mathematics **J. E. Belasco** (Minutes 715 and 754), Clerk Assistant. This appointment if approved would be dated from 1st April.

Marine Division.—To be *Principal Clerk* at a salary of £225 per annum, **H. Keeton** (Minutes 654 and 754) from Staff Assistant.

To be *Principal Clerk*, vice H. L. B. Tarrant, **L. H. Powers** (Minute 754) to take charge of the Registry and Office at South Kensington under the supervision of the Chief Clerk.

To be *Clerk Assistant* at a salary of £75 per annum, **Miss E. G. Picknett** (Minute 654).

Special Increases of Salary to take effect from 1st April, 1920.

Seniority grading on proficiency following war service :—

F. G. Whitaker (Minute 782) (age 23) ... ...
G. C. Baldwin (Minute 782) (age 22) ... ...
H. W. Davis (Minute 782) (age 23) ... ...
} Technical Assistants, from £75 to £97 10*s.* per annum.

P. R. Zealley (Minute 774) (age 26) Technical Assistant from £97 10*s.* to £112 10*s.* per annum.

A. G. Goad (Minute 801) from £100 per annum to £115 per annum while Chief Store Keeper (forms) and Deputy Office Keeper.

C. E. Goad (Minutes 742 and 754) Senior Office Keeper from £107 10*s.* per annum to £115 per annum.

Approved.

The Director was authorised to appoint a Principal Assistant for the work of the British Rainfall Organization.

The list of of normal increments set out in M.O. 27880 was approved.

831. Observations and Stations.—**Edinburgh Office** (Minute 818).—Reported—that in accordance with Minute 818 a letter (File 26735) had been sent to the Office of Works setting out the accommodation that would be required for the work of the Edinburgh Office, but that up to the present no suitable premises had been found.

It was agreed that the relation of the premises to the Office of Works would be on the same footing as other Air Ministry buildings. It was also agreed that further representations should be made to the Office of Works urging the desirability of a central situation.

Establishment of Distributive Stations.—Reported—that civilian meteorological stations for distributive purposes had been established as follows :—

Stations.	*Officer in Charge on 24/3/20.*	*Date.*
Cranwell	W. H. Pick	14th January.
Lympne	R. S. Read	14th ,,
Pulham	G. Harris...	19th ,,
Calshot	H. W. L. Absalom ...	2nd February.
Felixstowe	D. F. Bowering	3rd ,,
Hounslow	G. R. Hay	1st December.
Didsbury	G. H. L. Douglas Lane ...	24th February.
Biggin Hill	T. H. Applegate... ...	16th ,,

General regulations for Local Centres.—Submitted—the following (Order 1038) :—

(1) *Instruments and Equipment.*—The Meteorologist in Charge of a station is responsible that every reasonable precaution is taken to avoid loss or damage. Apart from such periodical reports as may be from time to time demanded, a

special report should always be rendered to the Office immediately any damage is incurred or any loss discovered. This should state fully the relevant facts and in particular whether it is considered that negligence is involved on the part of any of the staff.

(2) *Libraries.*—The provisions of regulation (1) apply to all books and publications held on charge and to regular issues made by the Office. These are not to be removed from one station to another except by the Director's instructions. Spring backs or binding cases are supplied for keeping loose pamphlets together.

(3) *Stores, Stationery, &c.*—The provisions of regulation (1) apply in this case also. A book should be kept showing all amounts requisitioned and received and stock in hand.

Towards the end of each month stock should be overhauled and requisitions submitted to the Office to meet estimated future requirements. If this rule is carefully observed, it should seldom be necessary to send urgent requisitions at intermediate times.

(4) *Petty Cash Accounts.*—A small expenditure will of necessity be incurred locally. To meet this a "petty cash account" will be kept by one of the staff. The Office will provide him with a ledger and will in the first instance advance to him the sum of £5. Immediately on the close of each month he will render in the ordinary way, on Form 0538, a claim in respect of the amounts he has disbursed. This claim and each supporting voucher must be initialled by the Meteorologist in Charge.

Approved.

Acceptance of voluntary stations for official publications (Order 1039) :—

The formal authority for including information from a station not maintained by the Office is contained in the certificate of inspection.

Subject to the station complying with conditions laid down by the Office regulations, the certificate for a health resort, for which inspection each year is specified in Circular 206, should be regarded as lasting until the end of the civil year from 1st January following the date of inspection.

For a station of the second order three civil years from 1st January following the date of inspection may be covered. For an auxiliary climatological station five years, and a rainfall station ten years, except in case of unforeseen contingencies.

A station of the second order or auxiliary climatological station which has been in regular working order in connection with the Office for over two inspections may be accepted for the health resort reports without special inspection.

The Superintendent in charge should report if any special circumstances come to his knowledge between inspections which throw doubt upon the full trustworthiness of the observations. The right of suspending the publication of data received is always reserved.

Approved.

Kew Observatory.—*Appointment of Caretaker and Resident Observer.*—Reported—that owing to the death of Mr. W. R. Corrin there was a vacancy for a caretaker and gardener at Kew Observatory, and that Mrs. Corrin (Minute 804), who had continued to take charge of the Observatory until further arrangements could be made, wished to leave before the end of the month.

Authority was given for the Director to make the appointment in consultation with Mr. Lempfert and Dr. Chree.

Issue of warnings of magnetic storms (Minute 822).—Reported—that a letter had been received from Mr. Raymond Barker (File 25090) reporting that the magnetic storm of 11th-12th August affected the work of cable ships, and urging the desirability of giving public warnings of magnetic storms and notifying ships on the high seas.

The photographic records at present run for two successive days ; hence the magnetic observatory would not, as a rule, recognise a storm until it was past. The acceptance of the suggestion would involve either (1) taking photographic records for shorter periods and having practically instantaneous development or (2) making arrangements for visible records or continuous eye-readings which would entail observations throughout the 24 hours

A visible record would be of great interest from many other points of view. It is proposed therefore to try a record of declination on the lines of the Benndorff Electrometer and in the meantime to inform Mr. Barker that if there is a public demand for the information the Office will endeavour to supply it.

Approved.

Shoeburyness (Minute 804).—*Cover for kite-balloon shed.*—Authority was given for the expenditure of £600 provided in the estimate for 1920–21 for the cover for the kite-balloon shed at Shoeburyness.

Larkhill.—*Appointment of Instructor in Meteorology* (Minute 820).—Reported—that some provision was necessary for instruction in meteorology at the Artillery School at Larkhill, and that a memorandum (M.O. 25761) on the subject had been submitted by the Superintendent for Army Services.

It is proposed that the meteorological staff now at Lavington should be moved to Larkhill and that lectures for officers up to the rank of Lieutenant-Colonel should be given by the Superintendent or other competent senior Meteorological Officer.

Holyhead.—Authority was given for the expenditure of £42 required for the repair of the tower of the anemometer at Holyhead.

Scottish Meteorological Society (Minute 818).—*Payment of war bonus to staff.*—Authority was given for the payment of £96 15*s.* 2*d.* to the Scottish Meteorological Society, being the amount required to bring the war bonus of the staff of the Edinburgh Office to the same scale as that of the Central Office during the year 1919–20.

Meteorological Work for Scotland (Minute 818).—It was agreed to continue the committee of the Meteorological Office, Edinburgh, on appointment by the Meteorological Committee, and that it should include representatives of the various Scottish Departments interested, to be an advisory Committee for the meteorological work for Scotland.

Ascension Island (Minute 820).—Reported—receipt of the following telegram on 23rd February :—

"Submit may be informed if meteorological equipment may be expected shortly. Now prepared erect and work sea level climatological station. Navy Wireless, Ascension."

Pending the completion of arrangements for the establishment of a contributive station at Ascension it is proposed to accept this offer to establish a climatological station and to supply instruments. The following reply has been sent to Navy Wireless Ascension :—

"Your telegram 20th ultimo. Arranging to despatch meteorological instruments. Director Meteorological Office." (File 50048.)

832. British Rainfall Organization (Minute 799).—Submitted—the following statement of accounts of the British Rainfall Organization.

METEOROLOGICAL OFFICE.

British Rainfall Organization.

Summary of Accounts for the Period 24th July, 1919, to 20th March, 1920.

Receipts.

	£	*s.*	*d.*
Balance on 24th July, 1919. Bank	155	19	9
Balance on 24th July, 1919. Cash	10	14	11
Subscriptions	745	7	9
Sales	1	15	3
Supplying data	55	19	6
Professional fees	39	12	10
Certificates	5	3	9
Advertisements	21	10	6
Meteorological Committee	968	8	8
	£2,004	12	11

Expenditure.

	£	*s.*	*d.*
Salaries and wages	832	4	2
Observers and instruments	29	8	1
"British Rainfall"	348	0	8
"Meteorological Magazine"	161	6	11
Printing, including stationery, bookbinding, books of reference, maps, &c.	31	8	4
Postage—(1) British Rainfall; (2) "Meteorological Magazine"; (3) General; (4) Telephone	94	10	3
Establishment	56	6	11
Travelling and Inspections	5	17	11
Suspense— Neath R.D.C., 13.3.1 Newport Corp., 5.8	13	8	9
Balance on 20th March, 1920. Bank	428	12	0
Balance on 20th March, 1920. Cash	3	8	11
	£2,004	12	11

Provision of safe for rainfall records.—Reported—the receipt of a letter (M.O. 26670) from the Office of Works stating that "the cost of installing a fireproof strong room would be approximately £200; and that large steel safes, if obtainable, would cost from £300 to £350, and that probably some further expenditure would be required on cutting away to get them in and on strengthening the floors."

It was agreed that as the present safe was fire-resisting, though not fire-proof, the matter should be allowed to stand over for the present.

Sale of publications.—Reported—that a letter (50882) had been received from the Controller of H.M. Stationery Office reporting that the Treasury had approved the principle of continuing the practice of presenting a copy of "British Rainfall" to subscribers of sums exceeding 10*s.* 6*d.* to the general funds of the Organization, and of offering the publications of the Organization to contributing observers at a reduced price (Minute 799). The sale price of the "Meteorological Magazine" to the general public has been fixed at 6*d.* per number for single copies, annual subscription 6*s.*, including postage. The special price to contributing observers has been fixed at 5*s.* per annum, including postage. (M.O. 52339.)

Payment of author's contributions to the "Meteorological Magazine."—Authority was given for the expenditure of a sum not exceeding £20 per annum as payment of author's contributions to "British Rainfall" and the "Meteorological Magazine."

833. Advisory Committee on Atmospheric Pollution (Minute 823).—It was agreed that in the year 1920–21 provision for the work on Atmospheric Pollution should be made from the vote for the Meteorological Office.

834. Publications.—Reported—the issue of the following publications :—

M.O. 218A. **Mercurial Barometers Graduated in Millibars.** 8-page pamphlet.
M.O. 224. **Meteorological Charts of the Mediterranean Basin.**
M.O. 227F. **Meteorological and Magnetic Year Book, 1916.** Hourly Values.
M.O. 229D. **Meteorological and Magnetic Year Book, 1917.** Geophysical Journal.
Meteorological Magazine. February and March, 1920.

Reported that the Monthly Meteorological Charts of the North Atlantic and East Indian Seas had been revised; copies of the charts for February and March respectively were laid on the table.

A proof of the following was laid on the table :—

M.O. 223. Computer's Handbook, Section II, sub-section 1.

835. Director's Report and Accounts :—

Transfer of lithographic press (Minute 809).—The new lithographic press was established at Headquarters, Air Ministry, Kingsway, on 21st January, 1920. The Daily Weather Report was published and issued from Headquarters as from that date.

Removal of Marine Division and Instruments Division.—The Marine Division of the Office was transferred to the Air Ministry on Tuesday, 2nd March, and the Instruments Division was transferred from 15, Cromwell Road to the Office in Exhibition Road on Friday, 5th March.

Meetings for Discussion (Minute 816).—The subjects of discussion were :—

On December 15th, E. Mathias: La Pluie en France.
On January 13th, E. Huntington: Solar Disturbances and Terrestrial Weather.
On January 26th, Prof. Cesare Fabrio: Descriptions of Types of Isobars over Italy and Considerations of the Causes which Determine their Structure.
On February 9th, E. T. Quayle, B.A.: Tropical Control of Australian Rainfall.
On February 23rd, Henry Hubert: Mission Scientifique au Soudan.
On March 8th, W. J. Humphreys: Factors of Climatic Control.
On March 22nd, M. Dechevrens: Diurnal Variation of the Air-Earth Current observed at Jersey, and Similarities between the Earth Current observed at Jersey and an Electric Tide derived from the Ocean Tide.

Lectures on Meteorology.—As Reader in Dynamical Meteorology in the University of London, the Director has given a course of nine lectures on "A General Survey of the Globe and its Atmosphere" at the Meteorological Office, South Kensington, on Fridays from 30th January–19th March.

Colonel Gold delivered two lectures at the Royal Institution, on 4th and 11th March on "Upper Air," also a lecture at the Scottish Meteorological Society on 19th March.

International Meteorology.—Copies of the Procès Verbaux of the International Meteorological Conference held in Paris from 30th September–6th October have been received. (Minute 795.)

Meteorological Reports issued by F.O. 5.—A complete list of reports drawn up by the Research Section and others in F.O. 5 was submitted. M.O. 27872.

Conference on Weather Reports by Wireless (Minute 809)—Submitted—the following report (File B 8865) :—

MINUTES OF CONFERENCE HELD AT 11.30 A.M., 5TH MARCH, 1920, ROOM 566, AIR MINISTRY.

Present:

Sir NAPIER SHAW, Director of the Meteorological Office (*Chairman*).
Colonel L. F. Blandy, Controller of Communications, Air Ministry.
Lieut.-Col. B. G. GARDINER, D.O.C.D., Admiralty.
Commander M. WILSON, Trade Division, Admiralty.
Lieut.-Col. E. GOLD, Meteorological Office, Air Ministry.
Commander L. A. BROOKE-SMITH, Meteorological Office, Air Ministry.
Major A. H. R. GOLDIE, Meteorological Office, Air Ministry.
Lieutenant H. D. GRANT, Meteorological Service, Admiralty.

(1) The minutes of the last meeting having been approved and signed (2) the conference proceeded to re-appoint a Meteorological Sub-Committee. The original sub-committee consisted of Colonel Wace, Mr. Lempfert, Major Gendle, Lieutenant Grant. Sir Napier Shaw proposed Commander Brooke-Smith in place of Major Gendle, and Colonel Gold in place of Mr. Lempfert, and also that an additional member representing the Controller of Communications should be added. It was agreed then that the sub-committee should consist of—

Colonel L. F. Blandy,
Lieut.-Col. E. Gold,
Lieut.-Col. Wace,
Commander L. A. Brooke-Smith,
Lieutenant H. D. Grant.

(3) The arrangements necessary to prevent overlapping between departments in the reception and distribution of wireless meteorological messages were considered. It was agreed that the central receiving and distributing centre should be the Air Ministry, but that existing arrangements should not be disturbed so long as the Admiralty Meteorological Service remains at the Admiralty. After the transfer of the latter Service to the Air Ministry, any necessary modifications in the existing arrangements for reception and distribution of meteorological information should be made with the Controller of Communications.

(4) M.O. Form 2610 (Instructions for Meteorological Telegraphy from Ships at Sea) was received. After some discussion on matters of detail, the instructions were approved as representing the meteorological data required and the form in which transmission should be effected. It was considered that when the instructions were ready for issue, notification should be made in Notices to Mariners, but that reproduction of the instructions in full in these Notices was not desirable.

(5) The question of W/T weather reports in the South Indian Ocean was discussed, and in particular a request to the Colonial Office from the Director of the Royal Alfred Observatory, Mauritius. This request was that the Admiralty and the Meteorological Office might be approached with reference to the inauguration of a scheme of reports from ships in the South Indian Ocean to the R.N. W/T Station at Mauritius, by means of which the Director would be considerably assisted in the preparation of his Synoptic Charts, and it was decided that the Admiralty be communicated with and also shipping companies on routes crossing the South Indian Ocean. Further, it was considered that the arrangements should be on the same lines as those for the North Atlantic.

The conference adjourned at 1.30 p.m.

Harvest Weather Forecasts (Minute 663)—Reported—that revised arrangements for the issue of harvest weather forecasts had been issued to the Board of Agriculture and Fisheries and others interested.

Papers received for communication to Societies:—

Professor S. Chapman, D.Sc., F.R.S., and E A. Milne, B.A., Fellow of Trinity College, Cambridge, "The Composition, Ionisation and Viscosity of the Atmosphere at Great Heights"—Royal Meteorological Society.
W. H. Dines, F.R.S., "The Ether Differential Radiometer"—Royal Meteorological Society.
L. F. Richardson, B.A., "The Supply of Energy to Atmospheric Eddies"—Royal Society.
L. F. Richardson, B.A., "Convective Cooling and the Calculus of Dimensions"—Physical Society.
Anders Ångström (Stockholm), "Temperature Distribution in Clouds and Fogs under the Influence of Radiation"—Royal Meteorological Society.
Harold Jeffreys, D.Sc, "Tidal Friction in Shallow Seas"—Royal Society.
Guy Harris and J. Logie, "Summary of Facts learned from the Montcalm Expedition."

Accounts. Charge of Forecasts by Telegram.—It was agreed that as from 1st April, 1920, the compilation fee of 6*d.* for forecasts in reply to enquiries should be discontinued, the charge for transmission alone being retained. (Order 1070.)

Treasury. Signing of Cheques (Minute 825)—Reported—the receipt of a lettter M.O. 27540 from H.M. Treasury enclosing a letter sent to the Bank of England stating that the following officers were authorised to operate on the account of the Meteorological Committee: Sir N. Shaw, Colonel H. G. Lyons, Mr. L. V. Meadowcroft, and that Mr. R. Corless would cease to sign.

Director's Orders for Confirmation—Reported the following :—1033 reducing the payment to Boy Messengers for attendance on Sundays at 8 a.m. to three hours at double rate from 15th February, 1920, in consequence of the cessation of issue of the Daily Weather Report (British Section) on Sundays.

1051 authorising the Principal Assistant in charge to arrange for extra duty at overtime rate on the part of one member of the staff up to, but not exceeding, five hours in any one week, and to distribute the attendance of the Registry Staff over the hours of 8 a.m. to 6 p.m. The order to apply both to Kingsway and South Kensington.

Approved.

Accounts.—Submitted—the following Statement of the Bank Account in the Cash Book :—

	£	s.	d.
Cash Balance on 27th January, 1920	8,446	18	9
Receipts from 27th January, 1920	7,309	12	4
	15,756	11	1
Cheques drawn from 27th January, 1920	11,568	12	10
Cash Balance on 23rd March, 1920	4,187	18	3